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FLOOD DAMAGES
COST BENEFIT
FLOOD CONTROL

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

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The Cattaraugus Creek Basin is predominately rural, however, the main branch of the creek passes through the villages of Arcade, Gowanda, and Springville. The lower 16 miles of the creek also flows through the Cattaraugus Indian Reservation. The main tributaries of the creek include Clear Creek at Arcade, Elton Creek, Buttermilk Creek, Spring Brook, Spooner Creek, South Branch Cattaraugus Creek, and Clear Creek at Iroquois.

The primary water resources need for which a solution was sought under this authority was to reduce flood damages within the Cattaraugus Creek Basin. In addition, for dam/reservoir plans that were developed, the addition of hydroelectric power generating facilities and recreation faciliti-s were also considered to maximize the economic efficiency of the basic flood control plans. As possible solutions, nine preliminary alternatives, and 11 additional detailed alternatives, in addition to the "No-Action" option, were formulated and assessed. These alternatives fell into two broad categories: structural and nonstructural local protection plans in areas where a high concentration of flood damages exist (Sunset Bay area and Arcade); and dam/reservoir plans at Springville. However, either the plans considered were not economically justified (i.e., benefit-to-cost ratios were less than 1.0), or, the plans were not socially acceptable. Therefore, the Selected Plan is the "No-Action" (do-nothing) Plan.

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

REPLY TO
ATTENTION OF

CATTARAUGUS CREEK STUDY
NEW YORK

FINAL FEASIBILITY REPORT

SYLLABUS

Cattaraugus Creek is about 70 miles long and drains an area of about 558 square miles of Western New York. The creek rises in the Appalachian plateau in western New York and flows in a westerly direction to its mouth in Lake Erie, 25 miles southwest of Buffalo, New York. Terrain in the basin varies from the hilly, steep-sloped and narrow valleyed portion of the basin upstream of Gowanda to the flat-sloped and wide-valleyed Lake Erie plain downstream of Gowanda.

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CATTARAUGUS CREEK STUDY
NEW YORK

FINAL FEASIBILITY REPORT

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ACKNOWLEDGEMENTS

This Final Feasibility Report was prepared through the efforts of many individuals on the Interdisciplinary Team within the Buffalo District of the Corps of Engineers. The following are the Corps personnel who were most instrumental in conducting the investigations and preparing the text presented herein:

Richard Aguglia	Project Manager
Roger Haberly	Economist
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Timothy Daly	Social Scientist
Leonard Bryniarski	Ecologist
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Bradford Price	Supervisory Hydraulic Engineer
Steve Predmore	Hydrologist
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The report itself was produced through the efforts of many other Corps personnel, including the following who contributed significantly to its preparation:

Christine Kosinski	Chief, Drafting Section
John Acker	Drafting Section
Mary Ann Schultz	Word Processor
Linda Sauberan	Word Processor

The Buffalo District Commander during preparation of this Final Feasibility Report was Colonel Daniel R. Clark; the Chief of the Engineering Division was Kenneth R. Hallock; and the Chief of the Planning Division was John Zorich.

Finally, the efforts of other individuals who participated in the study and report preparation, but whose names have not been mentioned above, are gratefully acknowledged.

SECTION I
INTRODUCTION

The purposes of this section are to introduce the reader to the Cattaraugus Creek Study and to explain the content and organization of this report. The section presents information on the geographical setting of the study area, the study authority, the purpose of the study, the scope of the study, study participants and coordination, the organization of the report, and prior studies and reports in the area.

1. GEOGRAPHICAL SETTING

Cattaraugus Creek is about 70 miles long and drains an area of about 558 square miles of Western New York as shown on Figure 1. The creek rises in the Appalachian plateau in western New York and flows in a westerly direction to its mouth in Lake Erie, 25 miles southwest of Buffalo, New York. Terrain in the basin varies from the hilly, steep-sloped and narrow valleyed portion of the basin upstream of Gowanda to the flat-sloped and wide-valleyed Lake Erie plain downstream of Gowanda.

The Cattaraugus Creek Basin is predominately rural, however, the main branch of the creek passes through the villages of Arcade, Gowanda, and Springville. The lower 16 miles of the creek also flows through the Cattaraugus Indian Reservation. The main tributaries of the creek include Clear Creek at Arcade, Elton Creek, Buttermilk Creek, Spring Brook, Spooner Creek, South Branch Cattaraugus Creek, and Clear Creek at Iroquois.

2. STUDY AUTHORITY

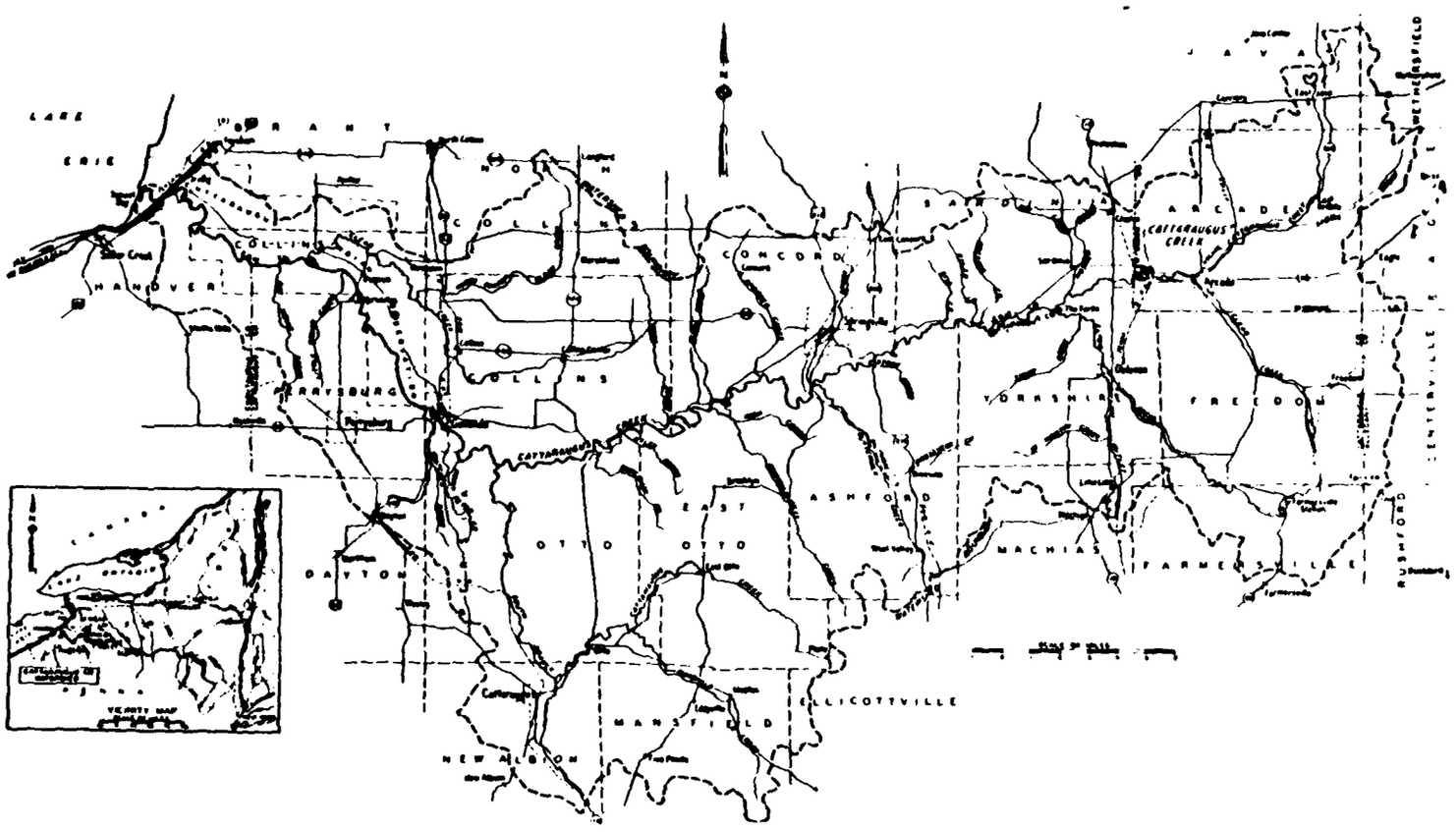
The Cattaraugus Creek Study was authorized by two resolutions - one adopted June 2, 1956 by the Committee on Public Works of the United States Senate at the request of the late Senator Irving M. Ives and the other adopted July 23, 1956 by the Committee on Public Works of the House of Representatives at the request of former Congressman John R. Pillion of the 42nd District. Text of the two resolutions is as follows:

June 2, 1956 Senate Resolution

"RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, That the Board of Engineers for Rivers and Harbors, created under Section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby, requested to review the reports of the Chief of Engineers on Cattaraugus Creek, New York, transmitted to Congress on November 25, 1949, and other reports, with a view to determining whether any modification of the recommendations contained therein is advisable at the present time."

July 23, 1956 House Resolution

"Resolved by the Committee on Public Works of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors be, and is hereby, requested to review the reports on Cattaraugus Creek, New York, submitted to the Congress on November 25, 1949, with a view to determining whether improvements for flood control are advisable at this time."



CATTARAUGUS CREEK STUDY
NEW YORK

BASIN MAP

U S ARMY ENGINEER DISTRICT BUFFALO
MAY 1987

FIGURE 1

FIGURE 1

3. PURPOSE OF FINAL FEASIBILITY REPORT

In accordance with the authorizing resolutions, the Cattaraugus Creek Study was initiated in 1965. A Preliminary Feasibility Report, recommending further study of a local protection project in the village of Gowanda, was completed in 1966. Detailed studies on this plan were initiated shortly thereafter and continued until funds were exhausted in 1970. In this same time period, preliminary studies of three reservoir sites were also conducted. Again, the studies continued until funds were exhausted in 1970.

In Fiscal Year 1985, funds were provided to resume the Cattaraugus Creek Study. The first activity in this resumption was completion of a Reconnaissance Report, the first step in the Corps of Engineers two-step study process. The Reconnaissance Report documented the results of the reconnaissance phase study effort conducted to identify the water and related resources problems and needs in the basin and to provide a preliminary indication of the potential of the study to yield solutions to these problems and needs. Contained within the Reconnaissance Report was a recommendation to continue the study into the feasibility or detailed planning phase with major emphasis on plans to reduce damages due to ice-jam flooding in the Sunset Bay area at the mouth of the creek.

The feasibility or detailed planning phase of the Cattaraugus Creek Study was initiated in April 1986. During the feasibility phase, detailed studies were conducted on the most promising alternatives identified in the reconnaissance phase, or some variation thereof, to: (1) identify all major components of each alternative; (2) to estimate the first cost of construction and the annual operation and maintenance cost associated with each alternative; (3) to estimate the benefits associated with each alternative; and (4) to assess the environmental impacts of each alternative. These studies were conducted in sufficient detail so that a rationale choice could be made among the various alternative plans investigated.

The purpose of this Final Feasibility Report is to document the results of the Cattaraugus Creek Study since its resumption in Fiscal Year 1985. However, as the Reconnaissance Report documented the results of the reconnaissance phase study effort, the main emphasis of this report is limited to documenting the results of the feasibility phase study effort with summary information on the results of the reconnaissance phase of the study.

4. SCOPE OF STUDY

The scope of the Cattaraugus Creek Study was primarily limited to formulation, assessment and evaluation of plans to reduce flood damages in the Cattaraugus Creek Basin. These plans included both regional (i.e., dam/reservoir) projects and local protection projects in areas where there is a high concentration of flood damages. In addition, for the dam/reservoir plans that were developed, the addition of hydroelectric power generating facilities and recreation facilities were also considered to maximize the economic efficiency of the basic flood control plans. However, as will be discussed in Section IV of the Main Report, "Plan Formulation," the study scope was reduced at the conclusion of the reconnaissance phase of the study to plans to reduce damages due to ice-jam flooding in the Sunset Bay area at

the mouth of the creek because plans to reduce flood damages at other locations were not economically justified. Further, as will be discussed in Section III of the Main Report, "Problem Identification," although other traditional Corps water resources areas were investigated (i.e., commercial navigation, water supply, streambank erosion, and water quality), the studies indicated that either: (1) there was no unmet need in this area (commercial navigation); (2) solution of the problem was outside the authority of the Corps of Engineers (water supply and streambank erosion); or (3) other agencies were taking the lead in solving the problem (water quality). Thus, no further studies were conducted in these other water resources areas.

5. STUDY PARTICIPANTS AND COORDINATION

One of the first actions accomplished after resumption of the Cattaraugus Creek Study in FY 1985 was to send letters to Congressional leaders and State and local officials informing them that the study had been resumed. A news release was also issued to inform the general public. This was followed shortly thereafter by a study newsletter providing them with a brief overview of past studies and the anticipated future directions of the current study. The newsletter also requested their input as the study progressed.

During the reconnaissance phase of the study, coordination was also initiated with various Federal, State, and local agencies in order to identify water resources problems and needs in the basin and to obtain information on existing or proposed land use plans, known cultural resources and fish and wildlife resources, including threatened and endangered species. This coordination was accomplished through both formal correspondence and numerous workshop meetings. Coordination was also initiated with local government officials during the same time period, including officials of the town of Otto and village of Springville where dam/reservoir alternatives for flood control and allied purposes were under consideration. Further, as hydroelectric power generating facilities were being considered as an add-on feature to the basic dam/reservoir alternatives at these locations, coordination was also initiated with the electric power companies having jurisdiction within the study area. Information was requested on past hydropower studies they may have conducted and also whether or not they would be interested in developing hydroelectric power generating facilities at these locations.

The completed Reconnaissance Report for this study, documenting the results of the reconnaissance phase planning effort, was distributed to the political leaders in the area and to various local, State, and Federal agencies for their review and comment. Loan copies of the report were also supplied to local libraries for review by the general public and various civic groups. In addition, until the supply was exhausted, personal copies of the report were made available to study participants free of charge. Several comments on the report were received. The New York State Office of Parks, Recreation, and Historic Preservation provided information on known cultural resources in the vicinity of several plans recommended for further study in the feasibility phase of the study and acknowledged that appropriate consideration was being given to archeological resources associated with these plans. They also provided information on possible assistance they could provide in implementing an alternative plan under consideration. The U.S. Environmental

Protection Agency listed several parameters they recommended be assessed in the environmental assessment that would be prepared for each plan under consideration in the feasibility phase of the study. The Chautauqua County Department of Planning and Development noted that shoreline flooding due to wind-driven high lake levels was not being considered as part of the study and recommended that such flood problems be considered. However, flooding due to high lake levels is not a long-term problem in the Cattaraugus Creek Basin, but rather, is a short-term problem brought about by the abnormally high level of Lake Erie over the last few years. Further, temporary solutions to the problem for the Sunset Bay and Hanford Bay areas at the mouth of the creek were being investigated at that time under the Advance Measures Program. However, this study determined that solutions to prevent flooding due to high lake levels were not economically justified. Thus, there was no need to study such plans further as part of the Cattaraugus Creek Study. The final comment received on the Reconnaissance Report was from the Erie and Niagara Counties Regional Planning Board who provided updated population information for several towns in the basin and who requested additional information on the need for additional water supply in the hamlet of Chaffee.

On August 4, 1986, a public meeting was held in Sunset Bay to present the results of the reconnaissance phase study and to solicit comments and information from the general public. Comments made at the meeting, with the exception of those who requested additional clarification of study results, indicated strong support for continuation of the study as outlined in the Reconnaissance Report. However, a member of the Seneca Nation of Indians stated that as of July 12, 1986 the Seneca Nation of Indians had terminated further discussions with the Corps of Engineers on the Cattaraugus Creek Study and current or pending projects on the Cattaraugus Indian Reservation. A copy of the public meeting announcement, along with the information packet on the Cattaraugus Creek reconnaissance study and the public responses received, are provided in the "Record of Public Meetings on Cattaraugus Creek, NY Reconnaissance Study" on file at the Buffalo District Office.

During the feasibility phase of the study, close coordination continued to be maintained with various Federal, State, and local agencies (i.e., U.S. Fish and Wildlife Service, National Park Service, New York State Department of Environmental Conservation, New York State Historic Preservation Officer, Seneca Nation of Indians, County, and town officials, etc.) in order to obtain their input into the formulation and assessment of various plans under consideration to reduce damages due to ice-jam flooding at the mouth of the creek. These agencies also participated in selecting the Tentatively Selected Plan for this study as set forth in the Draft Final Feasibility Report completed in May 1987 (revised July 1987). In addition, a Notice of Intent to prepare a Draft Environmental Impact Statement was published on April 7, 1987. One response - from the Seneca Nation of Indians - was received. In their response, the Seneca Nation of Indians requested that the following areas of concern be addressed in the Draft EIS: the study area should include the entire Cattaraugus Creek Basin; impacts on fisheries and wildlife should be comprehensively addressed; the potential for flooding above the proposed ice-retention structure should be assessed; potential erosion problems downstream of the proposed ice-retention structure, as well as sediment build-up in the upstream pool area, should be studied; the potential for development of anchor ice downstream of the proposed project site should

be assessed; and the impact of the proposed project on cultural resources of the Seneca Nation of Indians should be studied. These areas of concern were addressed throughout the course of the study and the results are discussed in subsequent sections of the Main Report and/or the Draft Environmental Impact Statement that accompanied the Draft Final Feasibility Report.

The completed Draft Final Feasibility Report and Draft Environmental Impact Statement, documenting the results of the feasibility phase study completed to date and containing a tentative recommendation to construct Alternative Plan 3B(2)(Modified) - an ice-retention structure with fish ladder upstream of the town of Versailles - was distributed to the elected officials in the area and to various local, State, and Federal agencies. Loan copies of the report were also supplied to local libraries for review by the general public and various civic groups. In addition, until the supply was exhausted, personal copies of the report were made available to study participants free of charge. Further, in accordance with National Environmental Policy Act (NEPA) procedures, the Draft Final Feasibility Report and Draft Environmental Impact Statement was filled with the U.S. Environmental Protection Agency (EPA) for a 45-day NEPA review. The Notice of Availability was published in the Federal Register by EPA on August 28, 1987. The official 45-day review period extended from August 28 to October 15, 1987. A Public Information Meeting/Section 404 Public Hearing was also held in the town of Versailles on October 15, 1987. The purposes of this meeting were to present the results of the feasibility phase study completed to date; to review the Tentatively Selected Plan (Plan 3B(2)(Modified)) which was also the National Economic Development Plan (NED Plan); and to solicit input into developing the final recommendation of the study. A copy of the meeting announcement, along with the information packet on the Cattaraugus Creek feasibility study and the public responses received, are provided in the "Record of Public Information Meeting and Section 404 Public Hearing on Cattaraugus Creek, New York Feasibility Study" on file at the Buffalo District Office.

Numerous review comments and letters on the Draft Final Feasibility Report and Draft Environmental Impact Statement and the Tentatively Selected Plan were received. As discussed in Section VI of the Main Report, "Local Views and Comments on the NED Plan," these review comments and letters generally opposed the Tentatively Selected Plan. Several responses also suggested that the solution to the ice-jam flooding problem in the Sunset Bay area at the mouth of the creek be located in that area, not 11 miles upstream in the town of Versailles. The views and concerns expressed as a result of public review of the Tentatively Selected Plan along with agency review comments were considered in developing the final recommendation of this study.

6. THE REPORT

The overall organization of this report consists of a Main Report and supporting documentation. The Main Report is written to give both the general and technical reader a clear understanding of the study, the study results, and the key decisions and conclusions. The supporting documentation provides additional detailed information on the design, costs, and benefits of the alternatives studied. It also includes copies of pertinent correspondence with organizations and individuals significant in the development of this study and minutes of workshop meetings conducted during the course of this study. Copies of the supporting documentation are available at the Buffalo District Office.

7. PRIOR STUDIES AND REPORTS

Many studies of the water resources problems and needs in the Cattaraugus Creek Basin have been made. The following is a summary of the various reports pertinent to this study:

a. An unfavorable report was submitted to Congress on July 11, 1939. The report, which was of preliminary examination scope, was principally concerned with flooding in the vicinity of the creek mouth at Lake Erie.

b. A report - "Preliminary Examination of Shores of Lake Erie for Harbors and Harbors-of-Refuge for Light Draft Vessels," dated July 19, 1946 - recommended the mouth of Cattaraugus Creek for further detailed study in the interest of small-boat navigation.

c. An unfavorable report was submitted to Congress on November 25, 1949. The report, which was of preliminary examination scope, was principally concerned with flooding of Cattaraugus Creek and the Thatcher Brook tributary at Gowanda, New York.

d. A Preliminary Feasibility Report for flood control improvements in the village of Gowanda on Cattaraugus Creek and Thatcher Brook was approved by North Central Division on December 9, 1966. The report concluded that further study of Cattaraugus Creek in Gowanda in the interest of flood control was warranted.

e. An interim report on the comprehensive study for the establishment of harbors and harbors-of-refuge for light-draft vessels on the south shore of Lake Erie with appropriate consideration of flood problems near the mouth of Cattaraugus Creek was completed in 1966. The report was subsequently printed as House Document 97, 90th Congress, 1st Session and became the basis for construction of a multi-purpose project completed in January 1983. The project provides a harbor for safe and easy navigation of small craft and refuge from lake storms. In addition, the project was intended to reduce flood damage to properties near the mouth and provide opportunity for breakwater fishing.

f. The final edition of a report entitled "Development of Water Resources in Appalachia" was completed in December 1969. This report was prepared by the Office of Appalachian Studies, Corps of Engineers, Cincinnati, Ohio, in response to Section 206 of the Appalachian Regional Development Act of 1965. The report recommended survey scope studies for three potential reservoir sites in the Cattaraugus Creek Basin and for a local protection project at Gowanda.

g. A Section 205 Reconnaissance Report for flood problems on an unnamed tributary to Cattaraugus Creek at Arcade, New York, was completed on November 8, 1974. The report stated that local interests were implementing a plan that would alleviate the flood problem in this area and recommended no further Federal action.

h. A Section 205 Report for flood problems on the Cattaraugus Indian Reservation was completed on June 19, 1978. Due to an unfavorable benefit-to-cost ratio, no further Federal action was recommended.

i. A Section 205 Reconnaissance Report for flood problems on the Cattaraugus Indian Reservation was completed on May 5, 1983, but it was determined that no Federal action was required as local interests had implemented a plan that alleviated the flood problems.

j. A Section 14 Initial Appraisal Report on Erosion along Cattaraugus Creek at North Street, Arcade, New York, was completed in February 1985. Based on the findings of the investigation, it was recommended that no Federal action be taken in regard to the erosion problem because of the lack of economic justification.

k. In January 1986 the Buffalo District completed a letter report addressing ice-jam related flood problems at the mouth of Cattaraugus Creek exacerbated by the small-boat harbor project completed in January 1983. The report recommended lowering the north berm of the harbor breakwater system and a one-time ice-breaking operation at the mouth of the creek. The ice-breaking operation was not implemented due to lack of local matching funds. Lowering of the north berm is scheduled for early 1988 provided that a right-of-entry is obtained from the Seneca Nation of Indians. It is anticipated that lowering the north berm will alleviate 50-percent of the flood damages exacerbated by the small-boat harbor project.

l. The Buffalo District investigated the feasibility of providing temporary protection from flooding induced by high lake levels in the Sunset Bay and Hanford Bay areas during June and July 1986 with a reanalysis conducted in November 1986 under the Advance Measures Program. Due to the unfavorable benefit-to-cost ratio for each location, no further Federal action was recommended.

SECTION II
EXISTING CONDITIONS

The purpose of this section is to present the environmental setting without the project to permit impact assessment of the various alternatives. The information presented will provide a data base for impact assessment and evaluation purposes.

8. MAN-MADE HUMAN ENVIRONMENT

a. Community and Regional Growth.

Figure 2 identifies the location of major communities within the Cattaraugus Creek Basin. The following subsections pertain to aspects of community and regional growth:

(1) Population - Table 1 identifies the 1980 population and growth trend since 1970 for Erie, Wyoming, Chautauqua, and Cattaraugus counties, and more specifically, for those townships and villages situated within the Cattaraugus Creek Basin. The 1980 population within the basin was about 57,363. Moderate population growth within the basin is expected in the future.

(2) Land Use and Development - Table 2 identifies general land use within the basin derived from available regional and county data. Agricultural (42%) and forest-brush-recreational and vacant (41%) land use occupy the greater portion of the basin, followed by residential (14%) land use and other developmental land use. Water and wetland areas account for approximately 3 percent of the basin area. Some future growth in residential, commercial, industrial, public, and transportation development is anticipated in the basin. No significant change in water and wetland area is expected. Development will likely occur around existing community developments and/or along major transportation routes. Growth areas include the townships of Concord, Sardinia, Arcade, Java, Otto, New Albion, Ashford, and the Seneca Nation's Cattaraugus Reservation. Two areas of unique consideration within the basin include: (1) the aforementioned Cattaraugus Indian Reservation, and (2) the New York State Nuclear Service Center - which is located along Buttermilk Creek in the town of Ashford (West Valley), New York, which is a tributary to Cattaraugus Creek. This Service Center is the nation's first nuclear processing plant which serves the scientific, educational, medical, governmental, and industrial organizations of New York State. Its on-site facilities include a nuclear fuel reprocessing plant and a nuclear waste cemetery. The cemetery contains tanks and burial areas for high-level liquid and solid wastes, and for low-level solid wastes. Low-level liquid wastes pass through a series of holding lagoons and are discharged into Buttermilk Creek. The rate of discharge is dictated by the flow in Cattaraugus Creek at the mouth of Buttermilk Creek. The levels of radio-active waste in Cattaraugus Creek are held within the limits specified by Part 20, Title 10, of the Federal Code of Regulations.

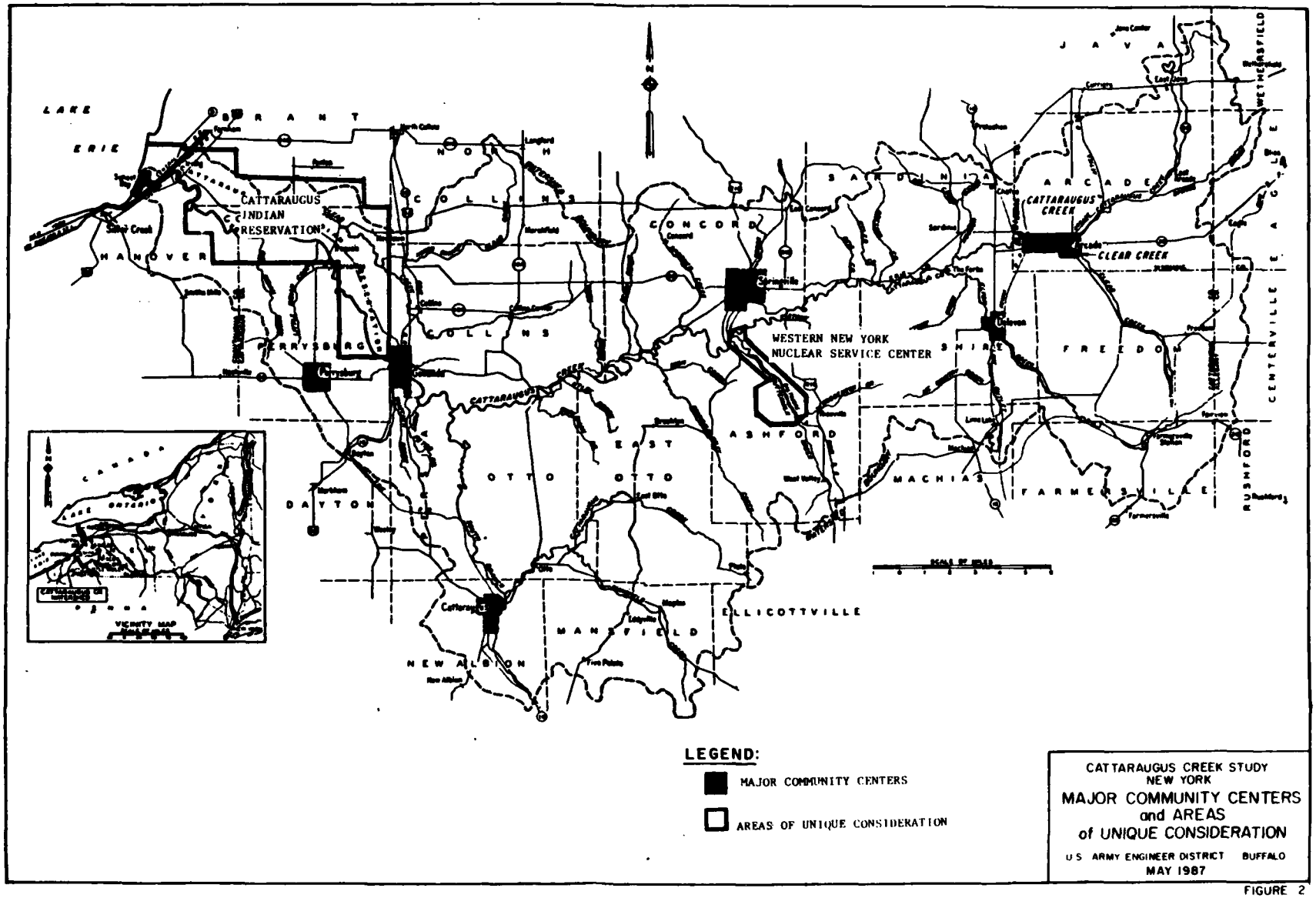

LAKE ERIE
BRANT
HANOVER
CATTARAUGUS INDIAN RESERVATION
COLLINS
CONCORD
SARDINIA
JAVA
ARCADE
CATTARAUGUS CREEK
CLEAR CREEK
WESTERN NEW YORK NUCLEAR SERVICE CENTER
FREEDOM
CENTERVILLE
WETHERSFIELD
PERRYSBURG
EAST OTTO
OTTO
ASHFORD
MACHIAS
FARMERSVILLE
RUSHFORD
DAYTON
ELLICOTTVILLE
MANSFIELD
NEW ALBION
LEGEND:
MAJOR COMMUNITY CENTERS
AREAS OF UNIQUE CONSIDERATION
CATTARAUGUS CREEK STUDY
NEW YORK
MAJOR COMMUNITY CENTERS
and AREAS
of UNIQUE CONSIDERATION
U S ARMY ENGINEER DISTRICT BUFFALO
MAY 1987

FIGURE 2

Table 1 - Local Population and Change

Area	1970	1980	Change	2000 (Projected)	Change
Erie County					
N. Collins	4,100	3,778	-	3,550	-
Collins	6,400	5,053	-	5,950	+
N. Gowanda (V)*	3,100	2,713	-	3,900	+
Concord	7,600	8,171	+	8,400	+
Springville (V)	4,400	4,285	-	4,250	-
Sardinia	2,500	2,792	+	3,050	+
Wyoming County					
Arcade	3,000	3,609	+	3,600	•
Arcade (V)	2,000	2,052	+	2,300	+
Java	1,900	2,378	+	2,700	+
Chautauqua County					
Hanover	7,800	7,878	+	9,400	+
Cattaraugus County					
Perrysburg	2,200	2,180	•	3,400	+
Perrysburg (V)	400	405		600	+
Dayton	2,000	1,952	•	2,600	+
Persia	2,600	2,477	-	2,900	+
Otto	700	828	+	900	+
E. Otto	900	942	•	1,000	
New Albion	2,000	2,161	+	2,500	+
Cattaraugus (V)	1,200	1,200	•	1,300	+
Mansfield	600	784	+	600	-
Ashford	1,600	1,922	+	1,900	•
Yorkshire	2,600	3,550	+	3,800	+
Machias	1,700	2,062	+	2,000	-
Freedom	1,400	1,840	+	1,400	-
Farmersville	800	1,048	+	900	-
Seneca Nation					
Erie County	1,100	1,612	+	1,200	-
Cattaraugus County	300	346	+	500	+

SOURCES: NYS Department of Commerce (1980)
NYS Department of Environmental Conservation 1981 Projections
NYS Department of Environmental Conservation - "Population Projection September 30, 1985"

* (V) denotes 'Village'

Table 2 - Cattaraugus Creek Basin Land Use, 1980 (Est.)

Land Use	Percent	Acres	Anticipated Change
Residential	14	44,800	++
Com./Public/Semi-Public	.7	2,240	+
Industrial	.5	1,600	+
Forest/Brush/Rec./Vacant	41	131,200	+/-
Agricultural	42	134,400	+/-
Water/Wetland	3	9,600	0
Transportation	-	-	+

SOURCE: County & Regional Data Books (1975-1980)

(3) Business and Industry/Employment and Income - Manufacturing is the major industry and employment sector followed by the wholesale-retail and service sectors. The average unemployment rate for the four county area in 1980 was about 6.7 percent. The average median family income for the four county area in 1980 was about $18,306. Projections (Table 3) indicate that employment in the manufacturing sector is expected to decline while employment in wholesale/retail and service oriented sectors is anticipated to grow.

The total economy of the Cattaraugus Creek Basin is diversified with substantial portions of trade, manufacturing and agriculture. The basin is generally rural and agriculturally oriented. Agricultural activities include dairy, forestry and minor food crop production. Industrial and commercial developments are generally situated within or near community nodes along major transportation routes.

(4) Recreation - Western New York is abundant in water resources, recreational facilities, and opportunities for recreation. Review of the New York Statewide Comprehensive Recreation Plan indicates that the most sizable future recreation deficiencies and developmental needs are expected in day-use and local winter facilities, with notable needs also in camping, and boating. Skiing, golfing, fishing, and hunting demands are expected to tax existing facilities. Trail activies may also need to be accommodated.

Except for Lake Erie, most of the medium to larger existing reservoirs are located a considerable distance from the city and residents of the Buffalo Metropolitan area. Generally, the periphery of the sizable lakes closest to the Buffalo area are extensively developed. In most cases, facilities are either developed and utilized extensively, while in others, facilities could probably be further developed.

The natural resources of the area contribute significantly to the recreational developments of the Cattaraugus Creek Basin. Cattaraugus Creek itself offers an excellent fishery. The basin provides hunting opportunities for small and large game animals and opportunities for birdwatching. The basin's recreational developments support activities such as fishing, hunting, boating, camping, hiking, horseback riding, swimming, skiing, snowmobiling, and picnicking. Zoar Valley along Cattaraugus Creek just east of the village of Gowanda is considered to be a special scenic resource of importance in the State. In general, demand for recreation facilities is increasing due to population growth and increased leisure time and income.

(5) Agriculture and Farmland - Agricultural activities in the basin include dairy, forestry, and food production to some degree. Reference Figures 3, 4, and 5 identify prime farmland areas within the basin, soil productivity for agricultural use, and county designated agricultural districts in the basin.

(6) Public Facilities and Services -

(a) Water Supply - Most of the municipal and individual water supply in the basin is obtained from wells. Figure 6 identifies the major area of

Table 3 - Employment by Industry by Place of Work, 1969 and 1978, and Projected, 1985-2030
(Total Number of Jobs)

	Historical		No-Change-in-Share				Low-Change-in-Share				Moderate-Change-in-Share			
	1969	1978	1985	1990	2000	2030	1985	1990	2000	2030	1985	1990	2000	2030
Total Employment	548,210	554,229	579,305	580,307	561,320	508,902	592,621	597,642	581,568	529,396	596,706	605,110	593,805	545,563
Agricultural Production	3,906	4,083	3,835	3,639	3,400	2,880	3,820	3,620	3,379	2,861	3,814	3,610	3,362	2,841
Nonfarm	544,304	550,146	575,470	576,668	557,921	506,022	588,801	594,022	578,189	526,535	592,891	601,500	590,443	542,722
Private	457,208	459,348	484,250	486,413	471,115	426,776	496,518	502,436	489,897	445,852	500,275	509,329	501,244	460,914
Agricultural Services, Forestry Fisheries, and Other	1,249	1,555	1,653	1,729	1,754	1,729	1,657	1,733	1,759	1,733	1,657	1,733	1,756	1,728
Mining	273	557	578	565	534	450	746	780	774	663	728	778	805	724
Construction	23,515	21,935	25,952	28,158	31,698	36,115	27,190	29,864	33,921	38,760	27,588	30,640	35,349	40,963
Manufacturing	180,384	146,003	144,882	139,633	125,460	100,354	143,867	138,266	123,922	99,020	143,424	137,332	122,287	97,055
Nondurable Goods	55,498	43,794	41,846	39,916	35,063	27,392	42,285	40,423	35,559	27,791	42,400	40,580	35,724	27,921
Durable Goods	124,886	102,209	103,036	99,717	90,397	72,963	101,581	97,843	88,363	71,229	101,024	96,752	86,564	69,134
Transportation and Public Utilities	33,541	28,818	29,054	28,755	27,162	23,684	28,585	28,150	26,489	23,068	28,419	27,833	25,964	22,418
Wholesale Trade	25,087	27,578	28,981	28,489	26,421	22,330	30,032	29,770	27,771	23,513	30,338	30,262	28,435	24,210
Retail Trade	87,830	96,018	99,132	99,323	96,596	86,742	102,210	103,229	100,985	90,854	103,189	104,979	103,743	94,192
Finance, Insurance, and Real Estate	20,033	23,275	26,079	26,591	25,737	23,193	27,483	28,407	27,769	25,103	27,932	29,223	29,043	26,642
Services	85,296	113,609	127,937	133,170	135,753	132,180	134,748	142,236	146,509	143,136	136,999	146,549	153,861	152,981
Government	87,096	90,798	91,221	90,255	86,805	79,246	92,283	91,586	88,292	80,683	92,617	92,171	89,199	81,808
Federal Civilian	9,480	9,530	9,520	9,583	9,644	9,659	9,819	9,963	10,084	10,119	9,913	10,130	10,352	10,476
Federal Military	7,772	4,433	4,416	4,416	4,416	4,416	4,416	4,416	4,416	4,416	4,416	4,416	4,416	4,416
State and Local	69,844	76,835	77,284	76,255	72,746	65,171	78,048	77,207	73,791	66,148	78,288	77,625	74,431	66,915

SOURCE: 1980 OBERS BEA Regional Projections

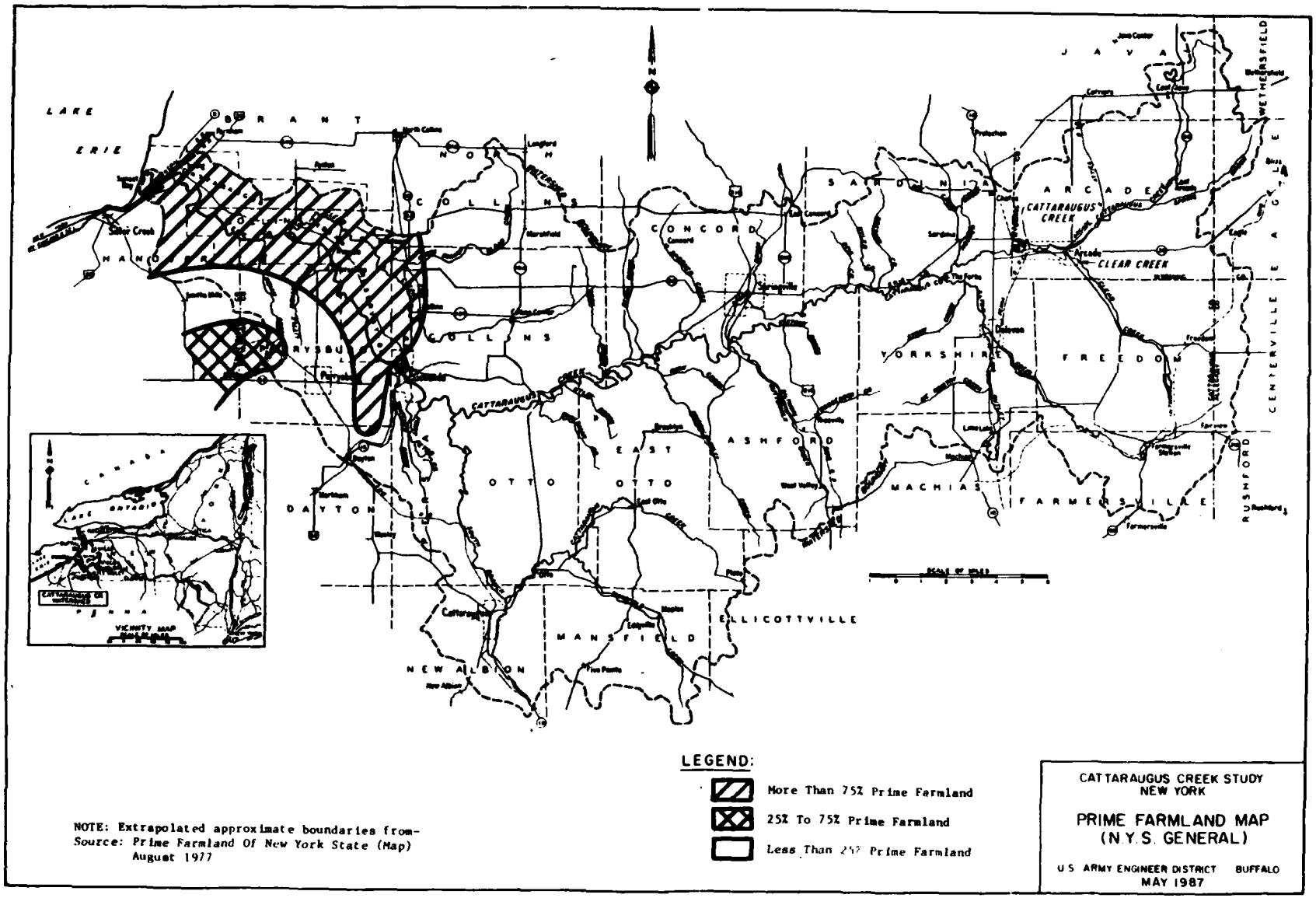
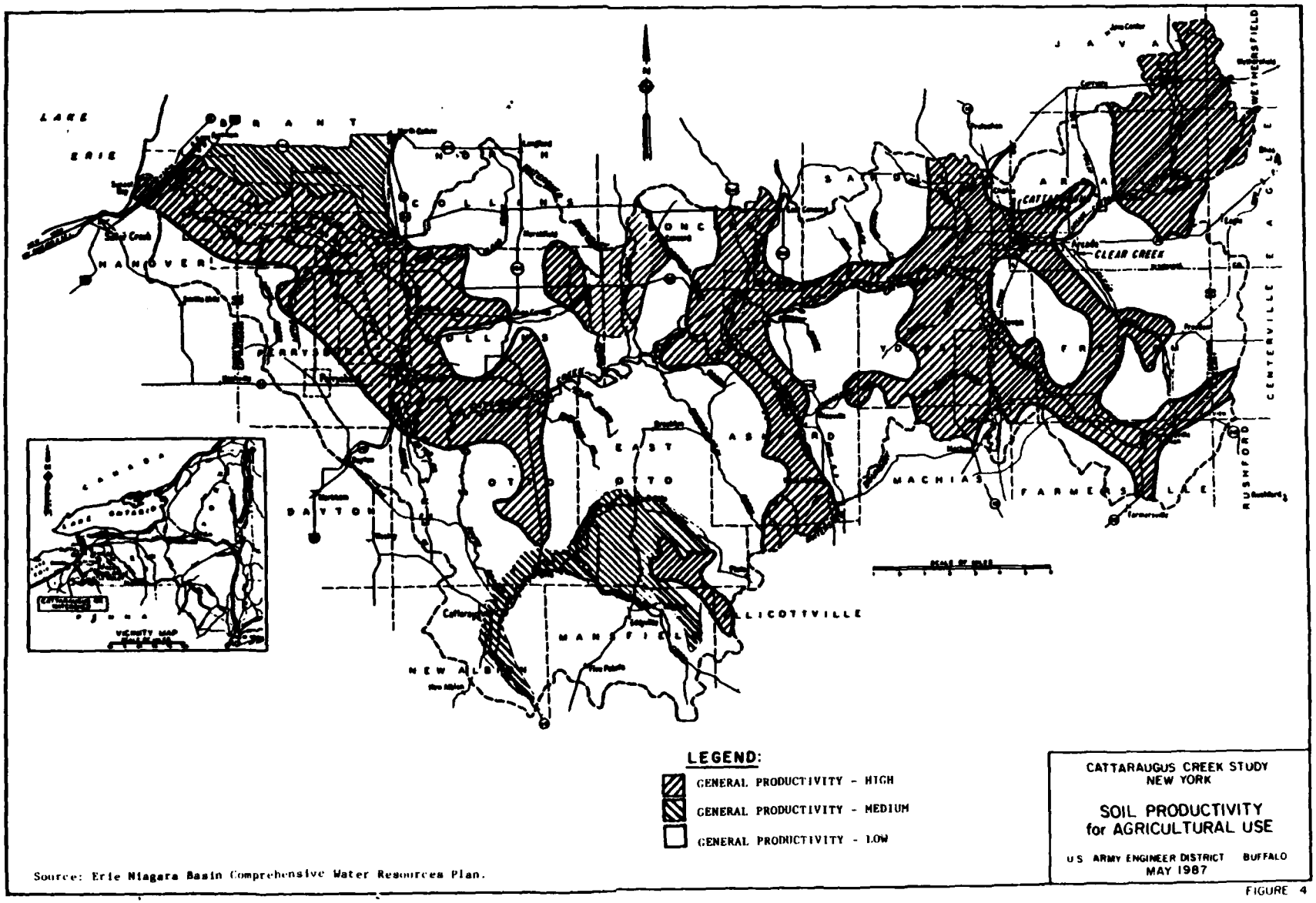

LAKE ERIE
BRANT
NORTH COLLINS
COLLINS
CONCORD
SARDINIA
JAVA
ARCADE
WETHERSFIELD
CENTERVILLE
EAST OTTO
OTTO
ASHFORD
MACHIAS
FARMERSVILLE
RUSHFORD
YORKSHIRE
FREEDOM
DAYTON
MANSFIELD
ELLICOTTVILLE
NEW ALBION
CATTARAUGUS CREEK
CLEAR CREEK
VICINITY MAP
LEGEND:
More Than 75% Prime Farmland
25% To 75% Prime Farmland
Less Than 25% Prime Farmland
NOTE: Extrapolated approximate boundaries from-
Source: Prime Farmland Of New York State (Map)
August 1977
CATTARAUGUS CREEK STUDY
NEW YORK
PRIME FARMLAND MAP
(N.Y.S. GENERAL)
U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 1987

FIGURE 3



Source: Erie Niagara Basin Comprehensive Water Resources Plan.

FIGURE 4

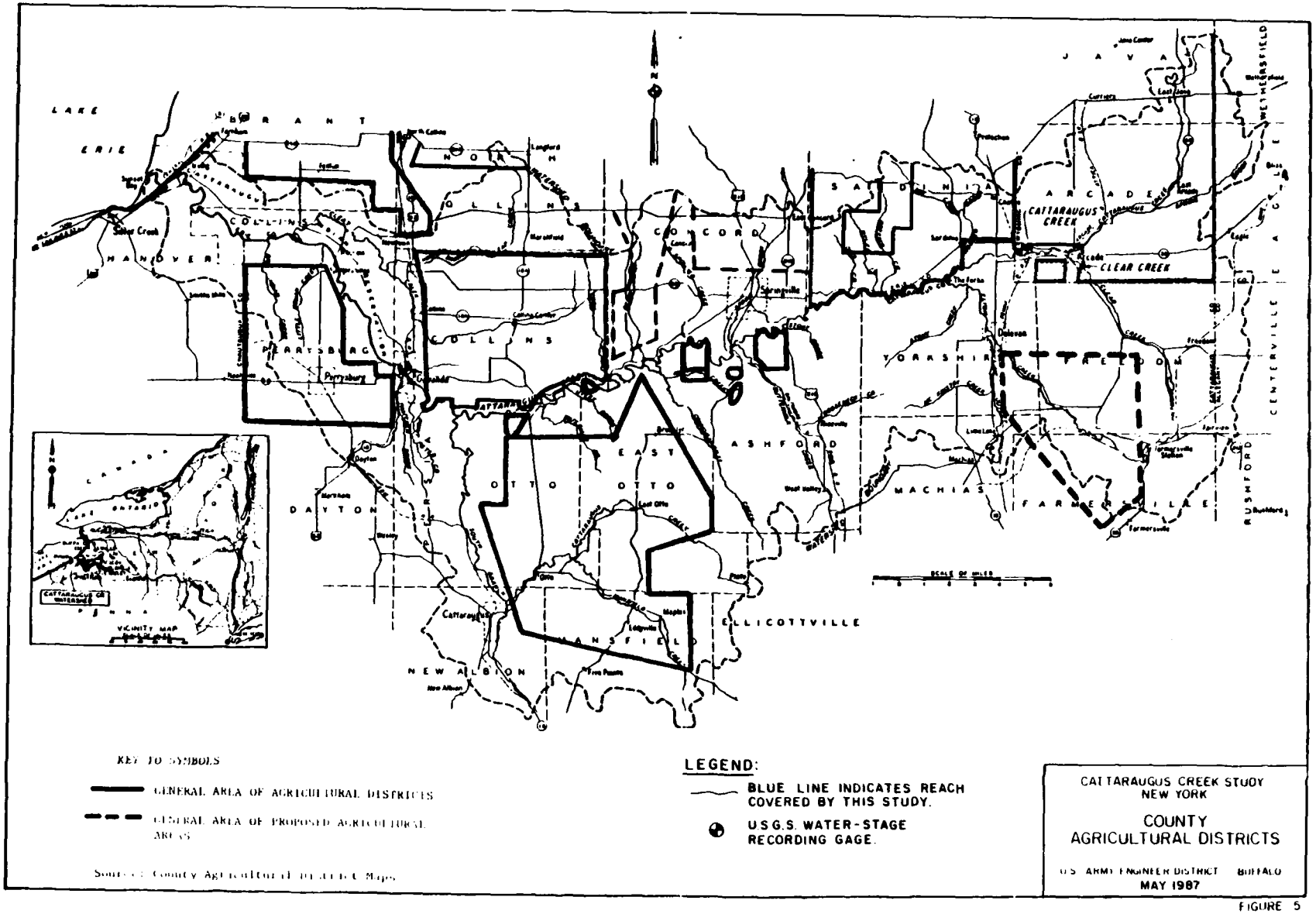

LAKE ERIE
CATTARAUGUS CREEK
CLEAR CREEK
CONCORD
COLLINS
OTTO
EAST ASHFORD
MACHIAS
FARMERSVILLE
ELLICOTTVILLE
NEW ALBION
DAYTON
KEY TO SYMBOLS
GENERAL AREA OF AGRICULTURAL DISTRICTS
GENERAL AREA OF PROPOSED AGRICULTURAL AREAS
LEGEND:
BLUE LINE INDICATES REACH COVERED BY THIS STUDY.
U.S.G.S. WATER-STAGE RECORDING GAGE.
CATTARAUGUS CREEK STUDY
NEW YORK
COUNTY
AGRICULTURAL DISTRICTS
U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 1987

FIGURE 5

ground water supply potential. Figure 6 also identifies communities with municipal water supply systems, and Table 4 identifies source data. The regional population trend is for limited growth to occur. The effect of such growth on existing municipal water supply systems may be negligible. Supply of this resource appears to be good and also expandable. Generally, irrigation is practiced in the region during the normal growing season to supplement the average rainfall. The agricultural use of water is tending to increase. The primary sources of this water are from streams and ponds. Very few farmers use well water. A general water quality problem is water hardness.

(b) Sewage Treatment - A number of communities have municipal sewage treatment systems. In the past, effluent discharges from inadequate sewage facilities affected the water quality in sections of the creek. However, plans are being implemented to improve facilities to accommodate Federal and State effluent standards. Isolated rural developments are utilizing septic systems. Major solid waste land fill areas are also utilized.

(c) Community Services - Social services are administered primarily through the county agencies. Rural law enforcement is administered primarily by the Sheriff's Department and the New York State Police. Local police departments are established where necessary. These law enforcement agencies generally provide services to the major villages and to surrounding townships. Fire districts and school districts are similarly established. Villages and townships generally have their own civil works or highway departments who compliment county and state highway departments. Further development is usually determined by demand, availability of resources and ability of the communities to meet the demands.

(d) Transportation - Figure 7 identifies major transportation routes within the region and in the Cattaraugus Creek Basin. Major roadways which traverse the basin include north-south Route 5, the NYS Thruway Route 90, Routes 62, 219, 240, 16, and 98; east-west Route 249, Genesee Road, Route 438, and Route 39. Several active rail lines also traverse the basin (generally north and south).

(e) Utilities - Major utilities which service the area include Niagara Mohawk, New York State Electric and Gas, National Fuel Gas, and New York Telephone. Springville operates a 500 kilowatt hydro-plant located on the main branch of Cattaraugus Creek just downstream of the village of Springville.

b. Property Values and Tax Revenues.

Based on preliminary data (1987), the average value of farmland within the basin ranges from about $400 to $1,200 per acre, with an average value of about $800 per acre. Community tax revenues are derived through a number of ways, including property and service district taxes, sales taxes and State and Federal revenue sharing.

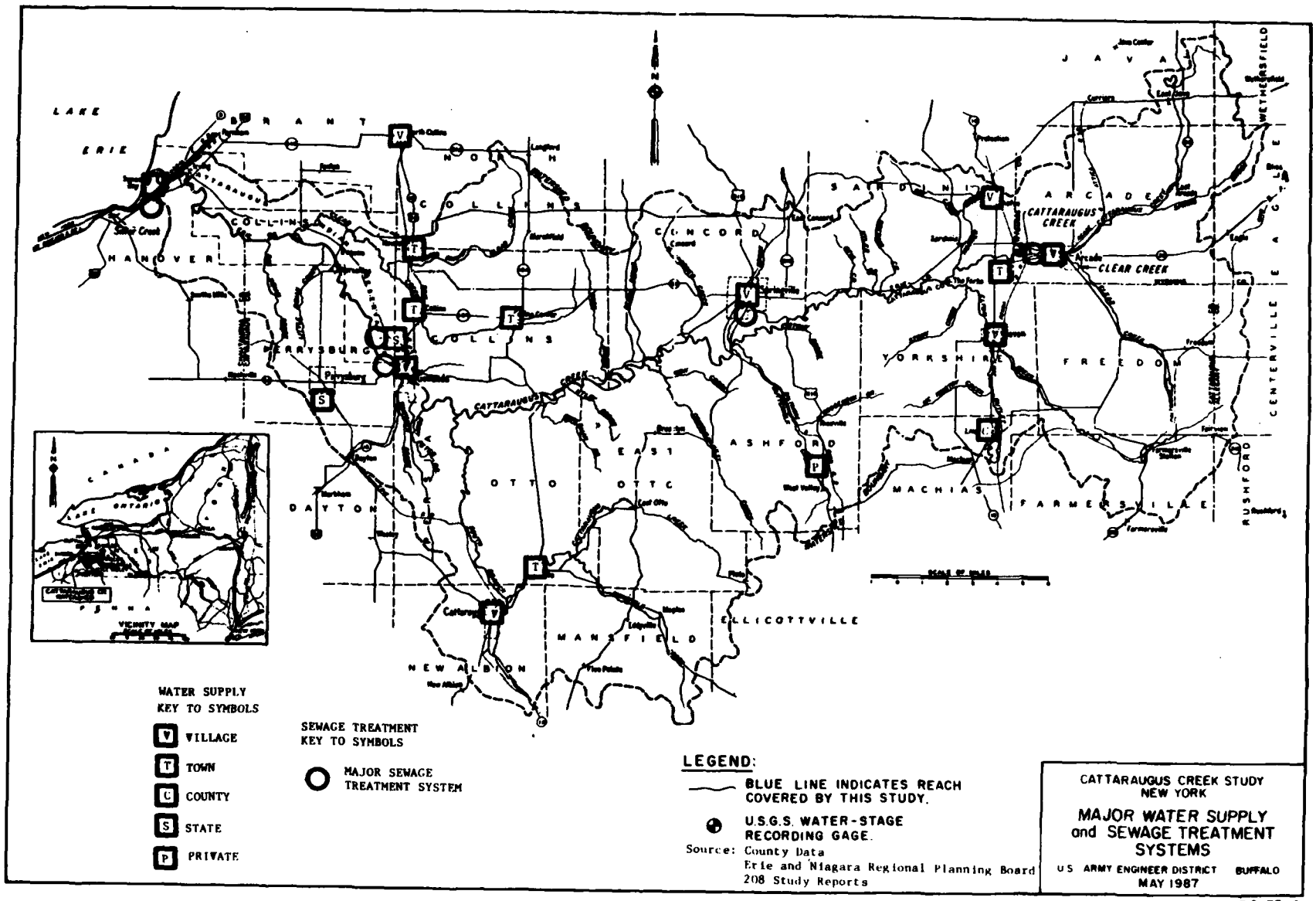

LAKE ERIE
BRANT
HANOVER
COLLINS
PERRYSBURG
CONCORD
SARDINIA
JAVA
ARCADE
CATTARAUGUS CREEK
CLEAR CREEK
YORKSHIRE
FREEDOM
CENTERVILLE
WETHERSFIELD
ASHFORD
EAST OTTO
OTTO
DAYTON
MACHIAS
FARMERSVILLE
RUSHFORD
ELLICOTTVILLE
MANSFIELD
NEW ALBION
WATER SUPPLY
KEY TO SYMBOLS
V VILLAGE
T TOWN
C COUNTY
S STATE
P PRIVATE
SEWAGE TREATMENT
KEY TO SYMBOLS
MAJOR SEWAGE TREATMENT SYSTEM
LEGEND:
BLUE LINE INDICATES REACH COVERED BY THIS STUDY.
U.S.G.S. WATER-STAGE RECORDING GAGE.
Source: County Data
Erie and Niagara Regional Planning Board
208 Study Reports
CATTARAUGUS CREEK STUDY
NEW YORK
MAJOR WATER SUPPLY
and SEWAGE TREATMENT
SYSTEMS
US ARMY ENGINEER DISTRICT BUFFALO
MAY 1987

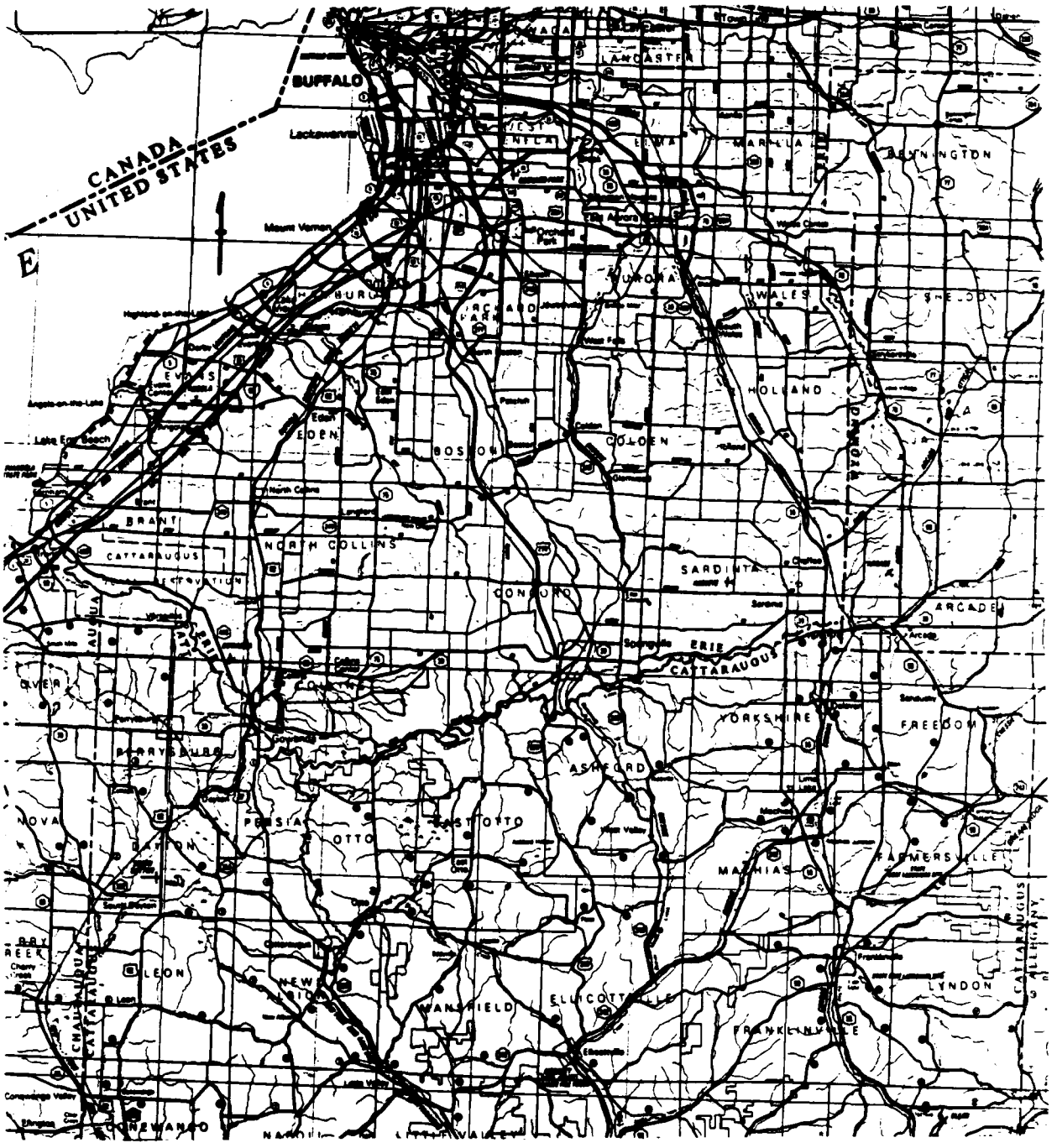
FIGURE 6

Table 4 - Cattaraugus Creek Basin Water Supply
(Primarily Ground Water)

Service Area	Source	Volume (MGD)	Remarks
Gowanda & Vicinity		1.9-2.3	
N. Collins (V)	4 Wells	.13	Wells located outside of village.
Collins #2 (T)	2 Wells	280 g/m	Collins well located on Cattaraugus Indian Reservation.
Collins #3 (T)	1 Well	151 g/m	Well located within Collins Center.
Gownada (V)	Point Peter Creek	.34	Supply in Cattaraugus County.
Gowanda (SH)	Clear Creek (S. Branch)	.31	Creek fed reservoir.
Springville & Vicinity	2 Wells	.56-.85	Wells located within village.
Arcade & Vicinity	Well	.42-.73	
Chaffee	1 Well	.10-.15	
West Valley	Well	.04-.07	
Otto Town District	Well	.01	
Cattaraugus (V)	Well	.11-.21	
Delevan (V)	Well	.12-.26	

SOURCE: . Section 208 Areawide Waste Treatment Management and Water Quality Improvement Program Reports. December 1977. Erie and Niagara County Regional Planning Board.

· Erie and Niagara Basin Comprehensive Water Resources Plan NYS Water Resources Commission. December 1969.



SOURCE: N.Y.S. ATLAS
N.Y.S. DEPARTMENT OF TRANSPORTATION

CATTARAUGUS CREEK STUDY
NEW YORK

TRANSPORTATION ROUTES

U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 1987

FIGURE 7

Table 6 - Assessment, Evaluation, and Comparison of Preliminary Alternative Plans

Item	Plan 1A (100-Foot High Dam - See Plate 1)	Plan 1B (150-Foot High Dam - See Plate 2)	Plan 1C (200-Foot High Dam - See Plate 3)	Plan 1D (100-Foot High Dam, Modify Existing Powerhouse - See Plate 1)
1. Plan Description	Plan 1A consists of construction of a 100-foot high roller-compacted concrete dam south of the village of Springville; a new power plant including four tube turbines with a total installed capacity of 4,400 kilowatts; and a power transmission line from the new power plant to the existing downstream Springville power plant. Maximum flooded pool elevation would be 1,200 feet and would inundate 1,600 acres of upland area. Plan would require the purchase of five structures and the abandonment of several roads within the pool area. Dam would regulate streamflow such that the existing Springville power plant would be able to increase its power output without modification. Dam would also be operated to extend the whitewater rafting season in Zoar Valley by 2 months.	Plan 1B consists of construction of a 150-foot high roller-compacted concrete dam south of the village of Springville; a new power plant including two Francis turbines with a total installed capacity of 3,900 kilowatts; and a power transmission line from the new power plant to the existing downstream Springville power plant. Maximum flooded pool elevation would be 1,250 feet and would inundate 3,200 acres of upland area. Plan would require the purchase of 34 structures, abandonment of several roads within the pool area, and the relocation of 12,000 LF of railroad tracks and 13,500 LF of State Route 39. Dam would regulate streamflow such that the existing Springville power plant would be able to increase its output without modification. Dam would also be operated to extend the whitewater rafting season in Zoar Valley by 2 months.	Plan 1C consists of construction of a 200-foot high roller-compacted concrete dam south of the village of Springville; a new power plant including three Francis turbines with a total installed capacity of 13,400 kilowatts; and a power transmission line from the new power plant to the existing downstream Springville power plant. Maximum flooded pool elevation would be 1,300 feet and would inundate 5,000 acres of upland area. Plan would require the purchase of 74 structures, abandonment of several roads within the pool area and relocation of 22,900 LF of railroad tracks and 22,100 LF of State Route 39. Dam would regulate streamflow such that the existing Springville power plant would be able to increase its output without modification. Dam would also be operated to extend the whitewater rafting season in Zoar Valley by 2 months.	Similar to Plan 1A. In addition to the features of Plan 1A, the existing Springville power plant would be expanded with the addition of a 500-kilowatt tube turbine to take maximum advantage of the streamflow regulation provided by the 100-foot high upstream dam.
2. First Cost (1) Federal NonFederal Total	Not Estimated Not Estimated $20,830,000	Not Estimated Not Estimated $41,200,000	Not Estimated Not Estimated $73,700,000	Not Estimated Not Estimated $21,000,000
3. Annual Costs (2) Interest Amortization Annual O&M Total	$ 1,996,000 500 362,000 $ 2,358,500	$ 3,946,400 900 535,000 $ 4,482,300	$ 7,705,400 1,800 1,002,000 $ 8,709,200	$ 2,012,400 500 432,000 $ 2,444,900
4. Average Annual Benefits (3) Flood Damage Reduction Hydropower Recreation Total	$ 280,400 853,100 40,200 $ 1,173,700	$ 353,900 1,862,400 40,200 $ 2,256,500	$ 353,900 3,117,000 40,200 $ 3,511,100	$ 280,400 837,500 40,200 $ 1,158,100
5. Benefit-to-Cost Ratio (3)	0.5	0.5	0.4	0.5
6. Average Annual Net Benefits (3)	-$ 1,184,800	-$ 2,225,800	-$ 5,198,100	-$ 1,286,800
7. Significant Environmental Impacts	Adverse impacts expected from this plan would be the inundation of approximately 1,600 acres of bottom land and upland terrestrial habitat. A number of mammals, birds, and reptiles may be lost or displaced into other nearby areas. A variety of vegetation types ranging from grasses to hardwood trees that provide feeding, resting, nesting, and rearing habitat would be lost. Some deer movement patterns may be altered. Stream habitat and associated coldwater fisheries trout habitat would be changed to a warmwater reservoir fish habitat with a fluctuating water regime. Water quality downstream of the project would be expected to temporarily decline during construction due to an increase in siltation and turbidity. Also, an increase in water temperatures within the reservoir could lead to some disruption in water temperatures downstream of the project, which could have a detrimental effect upon the existing temperature-dependent, coldwater trout and salmon fisheries.	Adverse impacts that would be expected from this plan would be the inundation of approximately 3,200 acres of bottom land and upland terrestrial habitat. A number of mammals, birds, and reptiles would be lost or displaced into other nearby areas. A variety of vegetation types ranging from grasses to hardwood trees provide feeding, resting, nesting, and rearing habitat would be lost. Some deer movement patterns may be altered. Stream habitat and associated coldwater fisheries trout habitat would be changed to a warmwater reservoir fish habitat with a fluctuating water regime. Water quality downstream of the project would be expected to temporarily decline during construction due to an increase in siltation and turbidity. Also, an increase in water temperature within the reservoir could lead to some disruption in water temperatures downstream of the project, which could have a detrimental effect upon the existing temperature-dependent, coldwater trout and salmon fisheries.	Adverse impacts that would be expected from this plan would be the inundation of approximately 5,000 acres of bottom land and upland terrestrial habitat. A number of mammals, birds, and reptiles would be lost or displaced into other nearby areas. A variety of vegetation types ranging from grasses to hardwood trees that provide feeding, resting, nesting, and rearing habitat would be lost. Some deer movement patterns may be altered. Stream habitat and associated coldwater fisheries trout habitat would be changed to a warmwater reservoir fish habitat with a fluctuating water regime. Water quality downstream of the project would be expected to temporarily decline during construction due to an increase in siltation and turbidity. Also, an increase in water temperature within the reservoir could lead to some disruption in water temperatures downstream of the project, which could have a detrimental effect upon the existing temperature-dependent, coldwater trout and salmon fisheries.	The significant impacts of this plan would be the same as those described for Plan 1A.
8. Carry Forward into Feasibility Phase	No.	No.	No.	No.

Table 6 - Assessment, Evaluation, and Comparison of Preliminary Alternative Plans (Cont'd)

Item	Plan 1E (150-Foot High Dam, Modify Existing Powerhouse - See Plate 2)	Plan 1F (200-Foot High Dam, Modify Existing Powerhouse - See Plate 3)	Plan 2 (Levee/Floodwall at Arcade - See Plate 4)	Plan 3A (Overflow Channel - See Plate 5)
1. Plan Description	Similar to Plan 1B. In addition to the features of Plan 1B, the existing Springville power plant would be expanded with the addition of a 1,000-kilowatt Francis turbine to take maximum advantage of the streamflow regulation provided by the new 150-foot high upstream dam.	Similar to Plan 1C. In addition to the features of Plan 1C, the existing Springville power plant would be expanded with the addition of two 1,000-kilowatt Francis turbines to take maximum advantge of the new 200-foot high upstream dam.	Plan 2 consists of construction of a 4-foot high levee/floodwall system along the right bank and a 2-foot high berm on the left bank of Clear Creek just upstream of its confluence with Cattaraugus Creek. In addition, to stabilize the eroding creek bank, the right bank of Clear Creek would be riprapped. Plan would reduce flood damages in Arcade by about 75 percent.	Plan 3A consists of obtaining a flowage easement from the Seneca Indian Nation for an area approximately 5,000 feet in length and 1,000 feet wide on the north flood plain of Cattaraugus Creek. The beach area adjacent to the flowage easement would also be lowered to +5 Low Water Datum. Further, annual loosening and breaking up of windrow ice, which forms along the lakeward margin of the beach berm, would also be performed. In this manner, when ice jams the mouth of Cattaraugus Creek and causes the creek waters to rise, the rising water would have an alternate outlet to Lake Erie without flooding adjacent communities. Plan would reduce damages from ice jam flooding in the Sunset Bay area by about 60 percent.
2. First Cost (1)				
Federal	Not Estimated	Not Estimated	Not Estimated	$153,000
NonFederal	Not Estimated	Not Estimated	Not Estimated	167,000
Total	$41,300,000	$73,900,000	Range of $500,000-$1,000,000	$320,000
3. Annual Costs (2)				
Interest	$ 4,130,300	$ 7,726,400	Not Estimated	$ 27,700
Amortization	1,000	1,800	Not Estimated	500
Annual O&M	604,000	1,072,000	Not Estimated	5,800
Total	$ 4,735,300	$ 8,800,200	Range of $44,000-$88,000	$ 34,000
4. Average Annual Benefits (3)				
Flood Damage Reduction	$ 353,900	$ 353,900	$ 13,100	$141,400
Hydropower	1,936,500	3,308,500	0	0
Recreation	40,200	40,200	0	0
Total	$ 2,330,600	$ 3,702,600	$ 13,100	$141,400
5. Benefit-to-Cost Ratio (3)	0.5	0.4	Range of 0.1-0.1	4.2
6. Average Annual Net Benefits (3)	-$ 2,404,700	-$ 5,097,600	Negative	$107,400
7. Significant Environmental Impacts	The significant impacts of this plan would be the same as those described for Plan 1B.	The significant impacts of this plan would be the same as those described for Plan 1C.	Significant environmental impacts associated with this plan would be short-term disruption to water quality during construction. There would be some immediate loss of existing benthic habitat within Clear Creek since riprap would be placed below the ordinary high-water level. However, benthic repopulation on the submerged riprap would be expected in a short period of time. Submerged riprap would also provide some cover and foraging habitat for fish. Construction would cause a temporary increase in turbidity and siltation within the creek. This may cause temporary distress to fish. However, most fish would be expected to temporarily move out of the immediate construction area during the time of construction. Some riparian vegetation (mainly overhanging trees and shrubs) would be destroyed.	Since this alternative involves little disturbance other than lowering of the beach berm, it is expected that there would be little or no significant impacts to the surrounding environment. Some riparian vegetation such as Cottonwood trees, dogwood shrubs, forbs, and grasses would be destroyed.
8. Carry Forward into Feasibility Phase	No.	No.	No.	Yes.

Table 6 - Assessment, Evaluation, and Comparison of Preliminary Alternative Plans (Cont'd)

Item	Plan 3B (Ice-Retention Structure - See Plate 6)	Plan 4 ("No-Action")
1. Plan Description	Plan 3B consists of constructing a 250-foot long ice-retention structure and a 250-foot long adjacent floodway for passage of flood flows just upstream of the town of Versailles (creek mile 11). The ice-retention structure would also have eight gated low flow openings incorporated into its design to permit passage of salmonids as well as other fish species. During the late fall and winter ice-forming periods, flow would be reduced for the purpose of forming a pool to develop a stable ice cover. The pool would be maintained during the winter and would prevent ice from flowing downstream and jamming at the creek mouth. The pool would then be drained in the spring when the threat of ice jam flooding was over. Plan would reduce ice jam flooding in the Sunset Bay area by about 90 percent.	The "No-Action" Plan, as the name implies, means that no project for flood control and allied purposes would be constructed by the Corps of Engineers in the Cattaraugus Creek Basin. As such, flooding in the basin would continue. Further, the opportunity to reduce the cost of electricity in the basin would be foregone. In addition, demand for additional recreational boating, fishing, and whitewater rafting/boating facilities would also not be met.
2. First Cost (1)		
Federal	$ 647,000	$ 0
NonFederal	38,000	0
Total	$ 685,000	$ 0
3. Annual Costs (2)		
Interest	$ 60,100	$ 0
Amortization	1,000	0
Non-Federal	8,800	0
Total	$ 70,100	$ 0
4. Average Annual Benefits (3)		
Flood Damage Reduction	$ 199,100	$ 0
Relocation	0	0
Recreation	0	0
Total	$ 199,100	$ 0
5. Benefit-to-Cost Ratio (3)	2.8	N/A
6. Average Annual Net Benefits (3)	$ 129,000	$ 0
7. Significant Environmental Impacts	Adverse impacts of this plan would be short-term and confined mainly to the period of construction. A temporary decrease in water quality caused by an increase in turbidity and siltation due to construction would be expected. This could cause temporary distress to fish within the area and downstream of the project. The area on which the structure would be built would cover over existing benthic habitat. The ice retention structure itself may cause disruption of fish movement within this area; however, provisions in the design of the structure would be provided for fish movement. Ponding of water behind the structure would only occur during the ice formation season. During non-flooding periods, the creek would be allowed to flow at its normal rate.	Continued disruption to the ecosystem due to flooding and activities associated with it.
8. Carry Forward Into Feasibility Phase	Yes.	Yes.

(1) Based on October 1985 price levels. Does not include cost for mitigation of adverse environmental impacts that may be required. Mitigation will be considered in the feasibility phase of the study, as appropriate.

(2) Based on October 1985 price levels and 8-5/8 percent interest rate. Period of analysis is 100 years for Plans 1A-1F and 50 years for Plans 2, 3A, and 3B. Includes interest during construction.

(3) Based on October 1985 price levels and 8-5/8 percent interest rate. Period of analysis is 100 years for Plans 1A-1F and 50 years for Plans 2, 3A, and 3B.

SOURCE: "Cattaraugus Creek, New York Reconnaissance Report," March 1986.

18. DEVELOPMENT OF DETAILED ALTERNATIVE PLANS

a. General.

As previously discussed, two structural plans, in addition to the "No-Action" Plan (Plan 4), were carried forward into the feasibility phase of the study. These plans were Plan 3A (Overflow Channel) and Plan 3B (Ice-Retention Structure) whose primary purpose was to reduce damages due to ice-jam flooding in the Sunset Bay area at the mouth of the creek. Emphasis in the feasibility phase was placed on refining the design, quantities, cost estimates, and environmental and economic impacts of these plans. Further, additional field information was obtained to: refine water surface elevations associated with the creek under both with and without project conditions; to update previous flood damage estimates at the mouth of the creek: to determine if significant cultural resources were present in the vicinity of the various plans under consideration; and to obtain current aquatic and terrestrial biological data in the vicinity of the various plans under consideration. In addition, a Draft Environmental Impact Statement and a Draft Section 404(b)(1) Evaluation were prepared and included in the Draft FFR.

During the detailed planning phase, eight additional nonstructural alternatives were also formulated. These nonstructural plans involved raising the structures located in the Sunset Bay area at the mouth of the creek above the level of the flood waters. Thus, although the site itself would still be flooded, damage to the structures would be minimized. Plans were formulated to raise structures on both the north and south sides of the creek to various levels of protection ranging from a 10-year flood up to and including a 500-year flood.

b. Assessment, Evaluation, and Comparison of Detailed Plans.

Table 7, following, provides a brief description of the 11 plans considered during the feasibility phase of the study to reduce damages due to ice-jam flooding in the Sunset Bay area at the mouth of the creek along with their estimated costs. The table also compares the economic and environmental impacts of these 11 plans. The basis of comparison is the "No-Action" (do-nothing) Plan.

Table 7 - Assessment, Evaluation, and Comparisons of Detailed Alternative Plans

Item	Plan 3A (Overflow Channel - See Plate 7)	Plan 3B(1) (Ice-Retention Structure - see Plate 8)	Plan 3B(2) (Ice Retention Structure with Fish Ladder - see Plate 9)	Plan 3B(2)(Modified) (Modified Ice-Retention Structure with Fish Ladder - see Plate 10)
1. Plan Description	Plan 3A consists of constructing an overflow channel at the mouth of the creek with dimensions of 4,600 feet in length by 400 feet in width by two-to-three feet in depth. In addition, a protective berm, with a top elevation of 578.0, would be provided adjacent to the left bank of the channel to prevent the cottages in Beam's Marina from being flooded when the channel is carrying flood flows. The access road to Beam's Marina would also be lowered and would be flooded during a flood event greater than a two-year storm, effectively cutting off access to the area until the flood water subsided. The beach area at the downstream end of the overflow channel would also be lowered to +5.0 LWD. Further, maintenance dredging at the mouth of the overflow channel (8,300 cubic yards per year) and annual loosening and breaking up of the windrow ice, which forms along the lakeward margin of the beach bars, would also be performed. In this manner, when ice jams the mouth of Cattaraugus Creek and causes the creek waters to rise, the rising water would have an alternative outlet to Lake Erie without flooding adjacent communities. Plan would reduce damages due to ice-jam flooding and free flow flooding by about 30 percent.	Plan 3B(1) consists of a 270-foot long ice-retention structure, a 200-foot wide adjacent floodway for passage of flood flows (overflow channel), and fisherman access facilities just upstream of the town of Versailles (creek mile 11). The ice-retention structure would also have three gated low-flow openings incorporated into its design to permit passage of salmonids and other fish species and to accommodate summertime flows. Further, a debris boom would be installed upstream of the ice-retention structure to trap debris before it becomes lodged against the structure. A 6-acre spoil disposal area would also be provided. This spoil disposal area would be used to dewater material that is dredged from upstream of the ice-retention structure prior to the material being removed from the site. Operation of the plan would include closing the gated low-flow openings during the late fall and early winter ice-forming period (i.e., when the temperature of the creek water reaches about 35°F) for the purpose of forming a stable ice cover. Once a stable ice cover is formed, the gated low-flow openings would then be left partially open to permit passage of salmonids and other fish species. The pool (and stable ice cover) would be maintained during the winter and would prevent ice from flowing down the creek and jamming at the creek mouth. The pool would then be drained in the spring when the threat of ice-jam flooding was over. Fisherman access facilities were also incorporated into the basic flood control plan. These facilities include a 15-car gravel parking lot, portable restroom facilities, and several gravel paths down to the creek. Annual maintenance activities include maintaining the structural integrity of the ice-retention structure, mowing the grass lined overflow channel, and removing the debris trapped by the debris boom. In addition, the bedload material trapped behind the ice-retention structure (32,000 cubic yards per year) would also be removed. It is anticipated that this bedload material would be removed by a private contractor at no cost, provided the contractor is permitted to keep the dredged material. Plan would reduce damages due to ice-jam flooding by about 60 percent.	Plan 3B(2) consists of a 270-foot long ice-retention structure, a 200-foot wide adjacent floodway for passage of flood flows (overflow channel), and a fish ladder just upstream of the town of Versailles (creek mile 11). The ice-retention structure would also have three gated low-flow openings incorporated into its design to accommodate summertime flows. Further, a debris boom would be installed upstream of the ice-retention structure to trap debris before it becomes lodged against the structure. A 6-acre spoil disposal area would also be provided. This spoil disposal area would be used to dewater material that is dredged from upstream of the ice-retention structure prior to the material being removed from the site. Operation of the plan would include closing the gated low-flow openings during the late fall and early winter ice-forming period (i.e., when the temperature of the creek water reaches about 35°F) for the purpose of forming a stable ice cover. The pool (and stable ice cover) would be maintained during the winter and would prevent ice from flowing down the creek and jamming at the creek mouth. The pool would then be drained in the spring when the threat of ice-jam flooding was over. While the pool and stable ice cover is being maintained, salmonids and other fish species would be able to continue upstream and downstream via the fish ladder. Annual maintenance activities include maintaining the structural integrity of the ice-retention structure, mowing the grass lined overflow channel, and removing the debris trapped by the debris boom. In addition, the bedload material trapped behind the ice-retention structure (32,000 cubic yards per year) would also be removed. It is anticipated that this bedload material would be removed by a private contractor at no cost provided the contractor is permitted to keep the dredged material. However, based on review of this plan with the USF&WS and NYSDEC, several additional features were added. These additional features included additional mitigation and operational features and the addition of fisherman access facilities. Therefore, the original version of this plan was dropped from further consideration and a modified version incorporating the additional features - Plan 3B(2)(Modified) - was carried forward for further consideration.	Plan 3B(2)(Modified) consists of a 270-foot long ice-retention structure, a 200-foot wide adjacent floodway for passage of flood flows (overflow channel), a fish ladder with a sea lamprey control barrier, and fisherman access facilities just upstream of the town of Versailles (creek mile 11). The ice-retention structure would also have three gated low-flow openings incorporated into its design to accommodate summertime flows. Further, a debris boom would be installed upstream of the ice-retention structure to trap debris before it becomes lodged against the structure. A 6-acre spoil disposal area would also be provided. This spoil disposal area would be used to dewater material that is dredged from upstream of the ice-retention structure prior to the material being removed from the site. Operation of the plan would include closing the gated low-flow openings during the late fall and early winter ice-forming period (i.e., when the temperature of the creek water reaches about 35°F) for the purpose of forming a stable ice cover. The pool would then be maintained until the end of June and would: (1) prevent ice from flowing down the creek and jamming at the creek mouth; and (2) in conjunction with the sea lamprey control barrier, would severely hinder sea lamprey migration into the upper reaches of the creek during their spring spawning period. While the pool is being maintained, salmonids and other fish species would be able to continue upstream and downstream via the fish ladder. However, since a sea lamprey control barrier (i.e., an 18-inch vertical jump) would be incorporated into the fish ladder, sea lamprey would be severely hindered from continuing upstream. Fisherman access facilities were also incorporated into the basic flood control plan. These facilities include a 15-car gravel parking lot, portable restroom facilities, and several gravel paths down to the creek. Annual maintenance activities include maintaining the structural integrity of the ice-retention structure, mowing the grass lined overflow channel, and removing the debris trapped by the debris boom. In addition, the bedload material trapped behind the ice-retention structure (36,000 cubic yards per year) would also be removed. At the present time it is anticipated that this bedload material would be removed by a private contractor at no cost provided the contractor is permitted to keep the dredged material. Plan would reduce damages due to ice-jam flooding by about 60 percent.
2. First Cost (1)	$ 1,710,000	$ 1,337,200	Not Evaluated (5)	$ 1,652,200
3. Annual Charges (2)				
Interest & Amortization	$ 157,600	$ 123,300	Not Evaluated (5)	$ 136,500
Annual O&M	71,600	13,400 (6)	Not Evaluated (5)	13,400 (6)
Total	$ 229,200	$ 136,700	Not Evaluated (5)	$ 149,900
4. Average Annual Benefits (3)				
Flood Damage Reduction	$ 113,600	$ 147,800	Not Evaluated (5)	$ 167,800
Costs Avoided	23,600	26,100	Not Evaluated (5)	39,100
Recreation	0	11,500	Not Evaluated (5)	11,500
Area Redevelopment	4,600	3,500		3,800
Total	$ 141,800	$ 208,900	Not Evaluated (5)	$ 222,500
5. Benefit-to-Cost Ratio (3)	1.62	1.53	Not Evaluated (5)	1.51
6. Average Annual Net Benefits (3)	-$ 87,600	$ 72,200	Not Evaluated (5)	$ 73,100
7. Significant Environmental Impacts	Not Evaluated (4)	Plan 3B(1) would provide a long-term barrier that would significantly preclude passage of salmon and trout to upstream areas (including tributaries) between Versailles and Springville during major portions of their spawning run periods. This would have a major significant adverse impact on the creek's fishery as well as on the fishery contribution provided by the creek to Lake Erie. Temporary degradation of water quality due to turbidity caused during in-stream construction and maintenance operations would also occur. Further, when the ice-retention pool is in operation, existing riffle areas within the pool area would be temporarily altered due to increased water depths and accumulation of bedload material.	Not Evaluated (5)	Installation of a fish ladder would allow for continuous ingress and egress of salmon and trout to and from upstream areas between Versailles and Springville whenever the ice-retention pool is being maintained. Further, installation of a sea lamprey control barrier in the fish ladder would significantly hinder upstream spawning run movement of sea lampreys during their spring spawning season, thereby potentially enhancing the salmon-trout sport fisheries in the creek as well as in Lake Erie. The sea lamprey control barrier would also decrease NYSDEC's chemical treatment costs to control sea lampreys in the upstream reaches of the creek. Temporary degradation of water quality due to turbidity caused during in-stream construction and maintenance operations would also occur. Further, when the ice-retention pool is being maintained, existing riffle areas within the pool area would be temporarily altered due to increased water depths and accumulation of bedload material.
8. Eligible for Consideration as the Selected Plan	No	Yes	No	Yes

Table 7 - Assessment, Evaluation, and Comparison of Detailed Alternative Plans (Cont'd)

Item	Plan 5A (Raise Structures on North Side: 10-Year Level of Protection)	Plan 5B (Raise Structures on North Side: 20-Year Level of Protection)	Plan 5C (Raise Structures on North Side: 100-Year Level of Protection)	Plan 5D (Raise Structures on North Side: 500-Year Level of Protection)
1. Plan Description	Plan 5A consists of raising all structures *on the north side of Cattaraugus Creek* in the Sunset Bay area to elevation 580.5, the level of flooding for a 10-year event. As such, 72 structures would be raised an average of about one foot. In this manner, although the area would still be flooded, flood damages up to the 10-year flood event *would be significantly reduced.*	Plan 5B consists of raising all structures *on the north side of Cattaraugus Creek* in the Sunset Bay area to elevation 581.4, the level of flooding for a 20-year event. As such, 110 structures would be raised an *average of about 1.5 feet.* In this manner, although the area would still be flooded, flood damages up to the 20-year *flood event would be significantly reduced.*	Plan 5C consists of raising all structures *on the north side of Cattaraugus Creek* in the Sunset Bay area to elevation 582.5, the level of flooding for a 100-year event. As such, 127 structures would be raised an *average of about 2 to 2.5 feet.* In this manner, although the area would still be flooded, flood damages up to the 100-year *flood event would be significantly reduced.*	Plan 5D consists of raising all structures *on the north side of Cattaraugus Creek* in the Sunset Bay area to elevation 583.9, the level of flooding for a 500-year event. As such, 203 structures would be raised an *average of about 3.5 feet.* In this manner, although the area would still be flooded, flood damages up to the 500-year flood event *would be significantly reduced.*
2. First Cost (1)	$ 945,000	$ 1,450,000	$ 1,670,000	$ 2,780,000
3. Annual Charges (2)				
Interest & Amortization	$ 85,100	$ 130,600	$ 150,300	$ 250,300
Annual O&M	0	0	$ 0	0
Total	$ 85,100	$ 130,600	$ 150,300	$ 250,300
4. Average Annual Benefits (3)				
Flood Damage Reduction	$ 56,100	$ 100,900	$ 126,400	$ 135,400
Costs Avoided	7,900	7,900	$ 11,300	11,300
Recreation	0	0	$ 0	0
Area Redevelopment	2,500	3,800	4,400	7,400
Total	$ 66,500	$ 112,600	$ 142,100	$ 154,100
5. Benefit-to-Cost Ratio (3)	0.78	0.86	0.95	0.62
6. Average Annual Net Benefits (3)	-$ 18,600	- $ 18,000	-$ 8,200	-$ 96,200
7. Significant Environmental Impacts	Not Evaluated (4)	Not Evaluated (4)	Not Evaluated (4)	Not Evaluated (4)
8. Eligible for Consideration as the Selected Plan	No	No	No	No

Table 7 - Assessment, Evaluation, and Comparison of Detailed Alternative Plans (Cont'd)

Item	Plan 6A (Raise Structures on South Side: 10-Year Level of Protection)	Plan 6B (Raise Structures on South Side: 20-Year Level of Protection)	Plan 6C (Raise Structures on South Side: 100-Year Level of Protection)	Plan 6D (Raise Structure on South Side: 500-Year Level of Protection)
1. Plan Description	Plan 6A consists of raising all structures *on the south side of Cattaraugus Creek* in the Sunset Bay area to elevation 580.5, the level of flooding for a 10-year event. As such, 81 structures would be raised an average of about one foot. In this manner, although the area would still be flooded, flood damages up to the 10-year flood event *would be significantly reduced.*	Plan 6B consists of raising all structures *on the south side of Cattaraugus Creek* in the Sunset Bay area to elevation 581.4, the level of flooding for a 20-year event. As such, 148 structures would be raised an average of about 1 to 1.5 *feet.* In this manner, although the area would still be flooded, flood damages up to the 20-year *flood event would be significantly reduced.*	Plan 6C consists of raising all structures *on the south side of Cattaraugus Creek* in the Sunset Bay area to elevation 582.5, the level of flooding for a 100-year event. As such, 253 structures would be raised an *average* of about 1.5 feet. In this manner, although the area would still be flooded, flood damages up to the 100-year *flood event would be significantly reduced.*	Plan 6D consists of raising all structures on the south side of Cattaraugus Creek in the Sunset Bay area to elevation 583.9, the level of flooding for a 500-year event. As such, 329 structures would be raised an *average* of about 2.5 to 3 feet. In this manner although the area would still be flooded, flood damages up to the 500-year flood event would be significantly reduced.
2. First Cost (1)	$ 1,060,000	$ 1,960,000	$ 3,320,000	$ 4,380,000
3. Annual Charges (2)				
Interest & Amortization	$ 95,500	$ 174,700	$ 298,900	$ 394,300
Annual O&M	0	0	$ 0	0
Total	$ 95,500	$ 174,700	$ 298,900	$ 394,300
4. Average Annual Benefits (3)				
Flood Damage Reduction	$ 36,300	$ 81,900	$ 125,100	$ 148,200
Costs Avoided	15,700	15,700	$ 37,200	37,200
Recreation	0	0	$ 0	0
Area Redevelopment	2,800	5,100	8,800	11,600
Total	$ 54,800	$ 102,700	$ 171,100	$ 197,000
5. Benefit-to-Cost Ratio (3)	0.57	0.59	0.57	0.50
6. Average Annual Net Benefits (3)	-$ 40,700	- $ 72,000	-$ 127,800	-$ 197,300
7. Significant Environmental Impacts	Not Evaluated (4)	Not Evaluated (4)	Not Evaluated (4)	Not Evaluated (4)
8. Eligible for Consideration as the Selected Plan	No	No	No	No

Table 7 - Assessment, Evaluation, and Comparison of Detailed Alternative Plans (Cont'd)

Item	Plan 4 ("No-Action")
1. Plan Description	The "No-Action" Plan, as the name implies, means that no project for flood control and allied purposes would be constructed by the Corps of Engineers in the Cattaraugus Creek Basin. As such, flooding in the basin would continue. Further, the opportunity to reduce the cost of electricity in the basin would be foregone. In addition, demand for additional recreational boating, fishing, and whitewater rafting/boating facilities would also not be met.
2. First Cost (1)	$ 0
3. Annual Charges (2)	
Interest & Amortization	$ 0
Annual O&M	0
Total	$ 0
4. Average Annual Benefits (3)	
Flood Damage Reduction	$ 0
Costs Avoided	0
Recreation	0
Total	$ 0
5. Benefit-to-Cost Ratio (3)	N/A
6. Average Annual Net Benefits (3)	$ 0
7. Significant Environmental Impacts	Continued disruption to the ecosystem due to flooding and activities associated with it.
8. Eligible for Consideration as the Selected Plan	Yes.

(1) Based on October 1986 price levels.

(2) Based on October 1986 price levels, 8-7/8 percent interest rate and 50-year period of analysis. Includes interest during construction, as appropriate.

(3) Based on October 1986 price levels, 8-7/8 percent interest rate, and 50-year period of analysis.

(4) An environment impact assessment was not conducted for this plan because the plan was not economically justified and, thus, was eliminated from further consideration.

(5) Economic and environmental evaluations were not conducted for this plan since this plan was dropped from further consideration and a modified version - Plan 3B(2)(Modified) - was carried forward for further evaluation.

(6) Does not include the cost to annually remove an estimated 36,000 cy of sediment that would accumulate behind the ice-retention structure. It is anticipated that this material would be removed by a local sand and gravel operator at no cost provided the contractor can keep the material.

c. Designation of NED Plan.

The NED Plan is defined as that plan which reasonably maximizes average annual net benefits consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. As indicated in Table 7, the plan that maximizes average annual net benefits is Plan 3B(2)(Modified) with average annual net benefits of $75,100 and, as such, is designated the NED Plan (See Plate 10).

(NOTE: Traditionally, before designating an NED Plan, the plans under consideration for such designation are optimized. In this instance, various features of Plan 3B(2)(Modified), such as the height of the structure, the pool size, the number of piers, etc., would be varied and the effects would be evaluated to determine the optimum plan of development. However, the science of ice engineering is relatively new and is not sufficiently developed to predict, with any degree of certainty, the effects of modifying one or several features of Plan 3B(2)(Modified). Therefore, in this instance, a conservative approach to design was taken. The increased reliability associated with this approach, and possible overdesign, outweighs the small cost savings that could result from a lower structure, a smaller pool, fewer piers, etc.)

c. Noise and Aesthetics.

The predominantly rural agriculturally oriented basin contains a number of scenic vistas. Its variety of terrain containing scattered small communities, farmland, woodland, creeks, and tributaries provides a generally aesthetically pleasing environment for local people and visitors to the basin. Picturesque Zoar Valley with its steep wooded slopes containing hardwood trees, evergreen trees and old abandoned orchards, along with its rolling and flatter bottomlands (including its croplands) is a significant natural resource area to western New York outdoor enthusiasts year-round. The basin displays a variety of fall foliage colors from late September through much of October.

Most noise probably occurs from vehicular traffic along major transportation routes, railroads, and in commercial areas of more developed community centers.

d. Community Cohesion.

Local officials and residents in the basin have identified problems pertaining to scattered areas of erosion along Cattaraugus Creek relative to farmland, residential properties and some public facilities; also, relative to some areas of flooding - particularly in downstream reaches between the mouth of the creek and the village of Gowanda. Local officials and residents have demonstrated significant effort in addressing the problems. Their efforts have included formation of basin protection committees to try to identify, survey and document problem areas, and to initiate resolutions to some of these problems - including requests for investigations through various Federal and State programs.

With regard to future development, a number of basin residents would probably be adverse to any significant development (i.e. reservoir construction) that could disrupt the existing rural setting and associated dwellings. Many residents are long-time property owners in the basin and would not want to relocate from their property or see their property significantly altered.

e. Cultural Resources.

The New York State Historic Preservation Office (SHPO) specified to the Corps that numerous known and potential historic sites were located in the Cattaraugus Creek Basin and that a cultural resources reconnaissance survey should be conducted for any structural plan being considered in the feasibility phase of the study. Accordingly, a cultural resources reconnaissance survey was conducted in the fall of 1986 for the two structural alternatives under consideration (Alternative Plans 3A and 3B). The survey indicated that no sites which might quality for inclusion on the National Register of Historic Places would be impacted by the NED Plan, the plan identified as the Tentatively Selected Plan in the Draft Final Feasibility Report (Draft FFR), and that there was no need to conduct additional archaeological surveys. A copy of the report documenting the results of the reconnaissance survey, entitled "An Archaeological Survey of the Proposed Local Flood Control Project on Cattaraugus Creek in Erie and Cattaraugus Counties, New York," is available for review at the Buffalo District Office.

9. NATURAL ENVIRONMENT

a. Air Quality.

The ambient air quality data for the Cattaraugus Creek Basin meets or exceeds the allowable maximum Federal and State standards for the Level I and Level II classifications for total suspended particulates, sulfur dioxide, carbone monoxide, ozone, nitrogen dioxide, lead, sulfates, and nitrates as indicated by the New York State Department of Environmental Conservation (NYSDEC). Reference the NYSDEC Memorandum on Quarterly Evaluation of Ambient Air Quality and Compliance with Ambient Air Quality Standards. NYSDEC maintains air quality levels as set forth in Part 256, Ambient Air Quality Standards of the Conservation Law. Air quality levels in the vicinity of Springville are classified as being Level II; outside the corporate limits or Springville, the air quality is classified as being Level I. Level I air quality standards are maintained throughout the remaining area of the Cattaraugus Creek Basin. Briefly, the land uses associated with classification Levels I and II are as follows:

Level I - Predominantly used for timber, agricultural crops, dairy farming or recreation. Habitation and industry is sparse.

Level II - Predominantly single and two family residences, small farms, and limited commercial services and industrial development.

b. Water Quality.

NYSDEC was contacted in April 1985 relative to stream water classifications in Cattaraugus Creek. Data obtained from NYSDEC indicated that from the creek's mouth upstream to the Gowanda State Hospital sewage treatment plant outlet pipe, the classification is "B"; from the outlet pipe upstream to the south boundary of the Cattaraugus Indian Reservation the classification is "D"; from the reservation's south boundary upstream to the south boundary of the Village of Gowanda the classification is "C"; from this south boundary of the village upstream to Elton Creek the classification is "B"; from Elton Creek to its source at Java Lake the classification is "C". A class "B" designation indicates that the stream's best usage in that designated section is for primary contact recreation and any other uses except as a source of water supply for drinking, culinary or food processing purposes. The classification of "C" indicates that the stream's best usage in that designated section is suitable for fishing and all other uses, except as a source of water supply for drinking; a classification of "D" indicates that the water is suitable for secondary contact recreation, but not conducive to propogation of game fish. From the aforementioned classifications provided, the water in Cattaraugus Creek varies in quality to some degree along different stretches of the creek. However, the ambient conditions for dissolved oxygen, fecal coliforms, and dissolved solids appear to remain within the acceptable standards for the stream classifications described. Recent communication with NYSDEC Region 9 on March 2, 1987, indicated that ambient water quality conditions at the Aldridge Street bridge in Gowanda, sampled in 1985, met all water quality Federal and State standards, with the exception of fecal coliform levels.

c. Fish, Wildlife, and Upland Vegetation Resources.

Information received from the NYSDEC indicated that Cattaraugus Creek is New York State's largest and most important salmonid fishery tributary to Lake Erie. This system contains the most mileage of trout water in the Erie-Niagara Drainage Basin. During the fall, large concentrations of coho and chinook salmon migrate from Lake Erie into the creek (late August-December) to spawn. Also, in the fall as well as between late February and April, steelhead trout migrate into the creek.

Both trout and salmon make migration runs up to the Springville Dam barrier. NYSDEC also stocks Cattaraugus Creek with salmonids. A chart provided by NYSDEC entitled "Summary of Salmonid stocking in New York waters of Lake Erie During 1984 and Projected Levels for 1985" revealed that salmonid species stocked include coho salmon (spring yearlings), chinook salmon (spring fingerlings), rainbow trout (fall fingerlings), steelhead trout (spring yearlings), and brown trout (spring yearlings). There are a number of tributary streams along Cattaraugus Creek where trout spawn successfully, thereby contributing young salmonids to the creek's fishery population. Tributaries above Versailles, New York where spawning trout successfully reproduce include Coon Brook, Derby Brook, and Spooner Creek. A variety of warmwater fish species are also found in Cattaraugus Creek. Included are yellow perch, common shiner, sunfish, carp, smallmouth bass, longnose and bluntnose dace, hognose sucker, white sucker, common stoneroller, pumpkinseed, and other species. Also, there is a seasonal walleye fishery at the mouth of the creek. Sea lamprey and carp also use the creek as a spawning stream. During the sea lamprey spawning run (approximately May-June), lamprey spawn up to the Springville Dam barrier.

In general, the Cattaraugus Creek Basin contains a diversity of habitat for both game and nongame wildlife. Such habitat includes open land, woodland, wetland, pasture land, cropland, and idle land, as well as riparian areas which adjoin many of the creeks and tributaries. Wildlife inhabiting the watershed include whitetail deer, red fox, woodchuck, skunk, opossum, raccoon, chipmunk, gray and red squirrel, cottontail rabbit, weasel, mink, muskrat, beaver and a variety of mice, voles and moles, in addition to a diversity of amphibians and reptiles. Many species of songbirds as well as raptors (hawks and owls) and game birds such as turkey, ruffed grouse, and woodcock utilize habitat in the basin for nesting and rearing their young. A 1986 biological survey of Cattaraugus Creek by the U.S. Fish and Wildlife Service in the vicinity of Versailles indicated that wildlife in the vicinity of the NED Plan, the plan identified as the Tentatively Selected Plan in the Draft FFR, is generally representative of similar areas in western New York. Further, sightings and observations of wildlife signs and tracks during the survey indicated that many of the aforementioned kinds of wildlife inhabit the creek's riparian habitat. With regard to threatened and endangered species protected by the Endangered Species Act, coordination with the U.S. Fish and Wildlife Service in 1985 and 1986 indicated that, except for transient individuals, no Federally listed or proposed endangered or threatened species under their jurisdiction are known to exist in the impact area of the NED Plan. Although the sand darter (Amocrypta pellucida) is not on the Federal list of protected species, it is considered endangered by New York State.

However, the sand darter has not been captured in Cattaraugus Creek for quite some time. Recent fishery surveys by both the U.S. Fish and Wildlife Service, as well as the New York State Department of Environmental Conservation, did not collect any specimens of this fish.

Although Cattaraugus Creek is an important ecological resource to New York State, there are a number of other known significant natural resource areas in the basin. The diversity of the natural resource areas ranges from cold-water sources for some of the creeks, to wild trout spawning habitat, water-fowl habitat, deer wintering areas, bogs, geologic formations, woodcock and grouse habitat, and a significant raptor (birds of prey) observation site.

Basin-wide, there is a diversity of woody and herbaceous vegetation. In addition to climate, soils and biotic factors, terrestrial vegetation diversity in the basin is also influenced by land use. Some of the land use types found are cropland, pastureland, hayland, woodland, and idle land. Annual vegetation in cropland areas include plantings of corn, oats, millet, ryegrass, winterwheat, barley, and buckwheat. Perennial grasses and legumes found in hayland/pastureland areas may include alfalfa, birdsfoot trefoil, clover, and timothy. With regard to woodlands, the basin is essentially within the Northern Hardwood Ecological Region. All of the basin's woodlands have been cut-over one or more times. In general, the present stand of trees consists of a mixture of second-growth hardwoods that contain both saw timber and pole-sized timber, with scattered growth of evergreens interspersed among the hardwoods and some evergreen plantations. Tree species found include basswood, American beech, black cherry, yellow birch, sugar and red maple, red and white oak, aspen, cottonwood, serviceberry, black willow, ironwood, hemlock, and white pine. A variety of shrubs and vines are also scattered along field and woodland peripheries, as well as, to some degree, within the woodland understory. Included are chockcherry, dogwood, witch-hazel, sumac, hawthorn, blackberry, raspberry, viburnum, elderberry, barberry, gooseberry, wild grape, and Virginia creeper. Nonwoody plants also inhabit terrestrial woodlands below the shrub level. Violets, gill-over-the-ground, pennywort, trillium, spring beauty, jack-in-the-pulpit, and blue cohosh are among the many different species of forbs found. Idle lands in the basin are usually overgrown with a variety of weeds containing grasses and forbs, as well as scattered growths of trees and shrubs. Woodland is principally the existing land use in the vicinity of the NED Plan. Pastureland and some cropland is also present at the site.

d. Wetlands.

There are a variety of wetland types in the Cattaraugus Creek Basin. Wetland overlay maps, prepared by NYSDEC for use with U.S. Geodetic topographic survey maps, as well as wetland maps prepared by the U.S. Fish and Wildlife Service (USF&WS), identify this important resource in the basin. For example, among the numerous range of wetland cover types identified by NYSDEC, are flooded, live, diciduous trees and/or conifers, to flooded shrubs, emergent plants, wet meadows, and open water with mixed floating and/or submergent vegetation. The USF&WS has identified palustrine persistent wetlands, riverine lower perennial wetlands with unconsolidated shorelines, as well as wetlands containing a permanent or temporary water

regime. In the vicinity of the NED Plan, there are no NYSDEC identified wetlands. However, the USF&WS map that includes the area of the NED Plan indicates the possible presence of a small wetland with an unconsolidated bottom, that appears to be less than 1 acre in size. This wetland is characterized by the lack of a large stable surface for plant and animal attachment.

e. Wild and Scenic Rivers.

Cattaraugus Creek is listed on the Nationwide Rivers Inventory, from the New York State Thruway to North Gowanda, as having value as a recreation resource in "unique proximity to the urban population in Buffalo." This segment of the creek includes a diversity of flow gradients, including a section of rapids. From Gowanda to Yorkshire, Cattaraugus Creek is also listed on the Nationwide Rivers Inventory for its botanical, recreational, and geologic attributes, particularly in and around the Zoar Valley, south of Springville, New York.

SECTION III
PROBLEM IDENTIFICATION

The purpose of this section is to inform the reader of the water and related resource problems and needs in the study area and for which this study seeks a solution. The section discusses the need to reduce flood damages in the Cattaraugus Creek Basin; reviews the planning constraint under which this study was conducted; discusses the specific planning objectives of the study; and reviews the conditions that would exist if no Federal action was taken.

10. PROBLEMS AND NEEDS

a. Flood Damages.

Flooding in the Cattaraugus Creek Basin is both a severe and persistent problem. For example, Sunset Bay, at the mouth of Cattaraugus Creek, experiences flooding almost annually. This flood problem is primarily a result of ice jamming the mouth of the creek, thus preventing flood waters from entering Lake Erie. The most recent flood event that caused significant damage at this location occurred on January 19 and 20, 1986 and caused flood damages in excess of $1,000,000. Flooding also occurs in the villages of Gowanda and Arcade. Further, spring floods cause significant agricultural damages, especially downstream of the village of Springville.

Due to the severe nature of the flood problem, one of the first steps in this study was to establish the location and extent of flooding in the Cattaraugus Creek Basin. In this endeavor, past reports for the area, especially "Appendix 14, Flood Plains - Great Lakes Basin Framework Study," 1975 and the February 1976 General Design Memorandum for Cattaraugus Creek Harbor, were extensively used. This information was supplemented by field visits and interviews with local residents. Further, during the feasibility phase of the study, field surveys were conducted in the Sunset Bay area to supplement and update information in the Cattaraugus Creek Harbor, GDM. The results of this investigation are presented in Table 5. As indicated, existing average annual flood damages in the Cattaraugus Creek Basin total about $206,800 without consideration of ice-jam flooding at the mouth of the creek and $498,100 including damages from ice-jam flooding.

(NOTE: Construction of the Cattaraugus Creek Small-Boat Harbor at the mouth of Cattaraugus Creek in 1983 was expected, among other things, to reduce damages due to ice-jam flooding at the mouth of the creek. However, the project actually increased damages due to ice-jam flooding by about $87,800 on an annual basis. Therefore, the Buffalo District is currently implementing a rectification project to partially alleviate the increased flood damages caused by the small-boat harbor project. The rectification project consists of lowering the north berm of the harbor breakwater system from +12.0 LWD to +5.5 LWD with construction scheduled for early 1988 provided that a right-of-entry is obtained from the Seneca Nation of Indians. It is anticipated that implementation of the rectification project will

Table 5 - Estimated Existing Average Annual Flood Damages in the Cattaraugus Creek Basin
(October 1986 Price Levels)

Location	Estimated Existing Average Annual Damages - 1986 Conditions of Development								
	Without Ice				With Ice				
	Residential ($/yr)	Commercial/ Industrial ($/yr)	Agricultural ($/yr)	Total ($/yr)	Residential ($/yr)	Commercial/ Industrial ($/yr)	Agricultural ($/yr)	Total ($/yr)	
Mouth to Village of Springville (1)	42,600	0	62,400	105,000	42,600	0	62,400	105,000	
Sunset Bay (2)	68,400	3,200	0	71,600	343,900	19,000	0	362,900	(4)
Gowanda (3)	9,400	1,000	0	10,400	9,400	1,000	0	10,400	
Arcade (1)	16,200	0	0	16,200	16,200	0	0	16,200	
South Branch (1)	3,600	0	Not Estimated	3,600	3,600	0	Not Estimated	3,600	
TOTAL	140,200	4,200	62,400	206,800	415,700	20,000	62,400	498,100	

(1) SOURCE: Appendix 14, Flood Plains - Great Lakes Basin Framework Study, 1975 updated by price levels.
(2) SOURCE: General Design Memorandum for Cattaraugus Creek Harbor, February 1976 updated by price levels and supplemented by new field surveys in the summer of 1986.
(3) Buffalo District Hydraulic notes dated 29 November 1967 updated by price levels and supplemented by field surveys.
(4) Includes $87,800 average annual flood damages induced by the Cattaraugus Creek Small-Boat Harbor Project. It is anticipated that these induced flood damages will be reduced by $44,500 annually as a result of lowering the north berm of the harbor breakwater system in early 1988.

reduce the induced flood damages by about 50 percent or $44,500 on an annual basis.)

b. Electrical Power Demand.

A report of the Planning Committee of the New York Power Pool entitled "New York Power Pool Long Range Plan: Electric Supply and Demand, 1985-2001," April 1976, states that the New York State Power Pool will have to add 3,189 megawatts of new generating capacity to meet expected increased electrical power demand in the time interval, 1985-2001. Further, the smallest planned individual expansion project to meet this increased demand is 300 megawatts (300,000 kilowatts). However, as will be discussed in subsequent sections of this report, the largest hydroelectric power generating facilities being considered as an add-on feature to the basic dam/reservoir plans for flood control will only add 15,400 kilowatts of installed capacity. Thus, it is highly unlikely that construction of such a facility would defer construction of any new planned electrical generating facilities. Rather, a more likely scenario is that the proposed hydroelectric project would displace the more expensive oil or gas-fired generating facilities presently in the system which make up a significant portion of the system's generating capability (about 35-percent in 1985). Therefore, although hydroelectric power generating facilities will be considered as an add-on feature of the basic dam/reservoir plans for flood control, they are expected to have only negligible effects in meeting the future increased demand for electrical power in New York State.

c. Recreation.

Based on past studies conducted by New York State and the significant growth in attendance at Corps facilities nationwide, demand for water-based recreation is increasing. This increasing demand is due to population growth and increased income and leisure time. Recreational boating and fishing are two of the categories that have the highest growth potential. In addition, the demand for whitewater rafting/boating, which presently occurs in Zoar Valley just downstream of Springville, is expected to grow significantly in the years ahead. Based on the above, recreation facilities to meet the increasing demand for recreational boating, fishing, and whitewater rafting/boating were included as add-on features to the basic dam/reservoir plans for flood control considered in this study.

d. Other Water Resources Problems not Considered.

Several other water resources problems in the Cattaraugus Creek Basin were considered in the early stage of the study but were not pursued further. The rationale for not pursuing these water resources problems further is as follows:

(1) Commercial Navigation - Cattaraugus Creek is not accessible to commercial shipping vessels nor has any need been expressed to modify the creek to accommodate such vessels. Thus, there is no need to study this aspect under the Cattaraugus Creek Study.

(2) Water Supply - The majority of the towns and villages in the Cattaraugus Creek Basin depend on groundwater sources, with their accompanying well fields, to meet their water supply needs. As part of this study, an analysis was made to determine the demand for water supply over the next 50 years and the ability of the existing systems to meet this future demand. The analysis indicated the following: (a) only two communities (Otto and Chaffee) require new facilities to meet future water supply needs; and (b) the most efficient method to meet this future demand is to install new wells (one - 100,000-gallon per day well at each location). Since construction of new wells is a nonFederal responsibility, no further consideration was given to this aspect under the Cattaraugus Creek Study.

(3) Streambank Erosion - Streambank erosion is a severe problem in the Cattaraugus Creek Basin and is a major concern of local residents. However, the Corps of Engineers does not have the authority to construct single-purpose streambank erosion control projects except for small, emergency projects to protect public facilities under the Corps Small Projects Program. Thus, no further consideration was given to this aspect under the Cattaraugus Creek Study.

(4) Water Quality - As previously stated, water in Cattaraugus Creek varies in quality to some degree in different stretches of the creek. However, the Environmental Protection Agency has issued nationwide discharge standards with the express purpose of establishing and maintaining the highest practical water quality in the effected streams. Therefore, to avoid duplication of effort, no further consideration was given to this aspect under the Cattaraugus Creek Study.

11. PLANNING CONSTRAINT

The Cattaraugus Reservation of the Seneca Nation of Indians occupies the north or right bank of Cattaraugus Creek from its mouth to mile 16.7 at the village of Gowanda (see Figure 2) and on the left or south bank from mile 2.5 at the town of Hanover to mile 16.4. In the past, the Seneca Nation has been very reluctant to sell or lease reservation land for Federal projects. Further, the State of New York does not have the right to acquire reservation land under eminent domain - reservation land can only be acquired by Act of Congress unless the Seneca Nation voluntarily agrees to sell the land. Therefore, throughout the course of this study, every attempt was made to site alternative plans under consideration off reservation land. In the one case where this was not possible, every attempt was made to keep adverse impacts to a minimum and to minimize the amount of reservation land needed for the project.

In addition to the need to situate alternative plans off reservation land to the fullest extent possible, the presence of the Cattaraugus Reservation posed a secondary constraint in that the Seneca Nation broke off all discussion with the Corps of Engineers on the Cattaraugus Creek Study from July 1986 till March 1987. This prevented field testing for possible cultural resources in the vicinity of a structural plan under consideration in the feasibility phase of the study (Plan 3A). However, this plan was subsequently eliminated from further consideration because it lacked economic feasibility. Further, permission was denied to enter reservation land to

update flood damage estimates prepared during the Cattaraugus Creek Small-Boat Harbor GDM study in 1976. Therefore, it was assumed that changes in flood damages on reservation land were similar to those which occurred off reservation land. (Note: Changes in flood damages in areas not on reservation land were based, in part, on new field surveys conducted in the summer of 1986.) It should be noted, however, that discussions with the Seneca Nation resumed in March 1987 and, since that time, they have participated in the review of the NED Plan, the plan designated as the Tentatively Selected Plan in the Draft FFR, and their comments and concerns were considered in developing the final recommendation of this study.

12. NATIONAL OBJECTIVE

Current Federal policy, as developed by the President's Water Resources Council, requires that alternative water and related resource plans be formulated in accordance with the national objective of National Economic Development (NED). National Economic Development is achieved by increasing the value of the Nation's output of goods and services and improving economic efficiency consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Therefore, in accordance with the guidance established in Engineering Regulation 1105-2-30, "General Planning Principles," dated 18 October 1985, this study was consistent with the planning requirements of the Water Resources Council "Principles and Guidelines" (P&G) and related policies.

13. SPECIFIC PLANNING OBJECTIVES

Specific planning objectives are the national, State, and local water and related land resources management needs (opportunities and problems) specific to a study area that can be addressed to enhance National Economic Development. Based on a review of the authorizing legislation for the Cattaraugus Creek Study, previous reports for the area, statements by individuals in the private sector, input from officials at many levels of Government, and an analysis of the problems and needs of the study area, as discussed previously, the specific planning objectives for the Cattaraugus Creek Study are as follows:

a. Enhance National Economic Development by reducing flood damages in the Cattaraugus Creek Basin.

b. Promote the region's ability to meet its need for inexpensive electrical power.

c. Promote the region's ability to meet its unfulfilled needs for additional recreational boating, fishing, and whitewater rafting/boating facilities.

d. Insure that proposed plans minimize, to the fullest extent possible, adverse impacts to the Seneca Nation of Indians.

14. CONDITIONS IF NO FEDERAL ACTION TAKEN (WITHOUT PROJECT CONDITIONS)

In any formulation, there is always the basic question . . . "Is there a justified need for change?" Therefore, the conditions that would exist if no

Federal action were taken was investigated for this study. Besides answering the basic question, these conditions will also provide a common basis for comparing alternative plans of improvement.

As a result of no action, flooding in the Cattaraugus Creek Basin would continue. However, since no new development in the flood plain is projected for the basin due to the severe flood problem, flood damages should not increase. Rather, the recent trend of raising structures located in the flood plain above the level of flooding is expected to continue for the next 5 to 10 years. It is anticipated that by 1995 approximately 31 structures in the Sunset Bay area (20 on the south side and 11 on the north side of the creek) will be raised. This will produce a corresponding decrease in average annual flood damages from $498,100 basin-wide to $485,400, a decrease of $12,700 annually. In addition, the north berm of the Cattaraugus Creek Small-Boat Harbor project breakwater system is expected to be lowered in early 1988. This action will reduce damages due to ice-jam flooding an additional $44,500 annually. As a result of no Federal action, the trauma and inconvenience experienced by flood victims in the basin would also continue. Further, the opportunity to reduce the cost of electricity in the basin would be foregone. In addition, demand for additional recreational boating, fishing, and whitewater rafting/boating facilities would not be met.

SECTION IV
PLAN FORMULATION

The purpose of this section is to provide a summary of the plan formulation planning effort conducted for this study. The section provides: a brief review of alternative plans addressed in previous studies and their applicability to this current study; discusses the formulation methodology used in this study; and discusses the development of preliminary and detailed alternative plans.

15. ALTERNATIVE PLANS ADDRESSED IN PREVIOUS STUDIES

Past studies for the Cattaraugus Creek Basin which are of particular concern to this current study include the 1966 Preliminary Feasibility Report for the village of Gowanda, the 1969 Appalachia Report and the 1983 Section 205 Reconnaissance Report for the Cattaraugus Indian Reservation. The 1966 Preliminary Feasibility Report (PFR) investigated, among other things, the feasibility of reducing flood damages along Thatcher Brook at its confluence with Cattaraugus Creek in the village of Gowanda. However, the plan was not economically justified (benefit-to-cost ratio of 0.14) and was dropped from further consideration. Further, as no significant new development has occurred in the flood plain since that date that would change the results of the previous economic analysis, there was no need to reexamine flood control plans in the Thatcher Brook area in this study.

The 1966 PFR and the subsequent 1969 Appalachia Report also recommended further study of a local protection project along Cattaraugus Creek in the village of Gowanda to protect two industries. However, the recommendation was predicated on benefits for "prevention of economic loss" which changed the benefit-to-cost ratio of the plan from 0.57, based on flood damage reduction benefits only, to 11.1. These "prevention of economic loss" benefits were a special type of benefit applicable to the Appalachia Study only, and measured the economic loss that would occur if the industries relocated out of the region after sustaining severe flood damages. This benefit category, however, was never accepted; thus, the benefit-to-cost ratio of the plan dropped to 0.57. Further, since 1969, one of the industries shut down its operations and the other industry built a flood wall that provides protection up to the 100-year flood event. Thus, since flood damages along Cattaraugus Creek in the village of Gowanda are now minor, there was no need to reexamine flood damage reduction plans for this area in this study.

The 1969 Appalachia Report also recommended further study of three dam/reservoir projects in the interest of flood control, hydropower, and recreation. These projects were located at Otto on the South Branch of Cattaraugus Creek and at Zoar Valley and Springville on the main stem. However, the proposed dam/reservoir project at Otto would significantly disrupt spawning habitat; cause extensive disruption to a large acreage of significant wetland resources; have significant adverse impacts on

existing land use and residential property owners; and is intensely opposed by area residents. The proposed Zoar Valley dam/reservoir project would cause disruption to an area of identified State and national natural, aesthetic and recreational significance; would have significant adverse impact on salmonid-run fisheries habitat; would have significant adverse impact on existing land use and residential property owners; and is also opposed by local interests. The Springville dam/reservoir project, on the other hand, avoids disruption to salmonid resources; avoids major disruption of significant wildlife habitat; and is not opposed by local interests. Therefore, based on the above, only the Springville dam/reservoir project was considered further in this study and the Otto and Zoar Valley dam/reservoir projects were dropped from further consideration.

The 1983 Section 205 Reconnaissance Report for the Cattaraugus Indian Reservation stated that local interests implemented a plan that alleviated their flood problem. Thus, there was no need to investigate this aspect further in this study.

16. GENERAL FORMULATION AND EVALUATION CRITERIA

Federal policy on multiobjective planning, derived from both legislative and executive authorities, establishes and defines the national objective for water resources planning, specifies the range of impacts that must be assessed, and sets forth the conditions and criteria which must be applied when evaluating plans. Plans must be formulated to meet the needs of the area with due regard to benefits and costs, both tangible and intangible and effects on the ecology and social well-being of the community.

The formulation of a plan, including the screening of alternatives, must of necessity be within the context of an appropriate framework and set of criteria. The planning framework is established in the Water Resources Council's "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies," which requires the systematic preparation and evaluation of alternative solutions to problems under the objective of National Economic Development (NED). The process also requires that the impacts of a proposed action be measured and the results displayed or accounted for in terms of contributions to four accounts: NED, Environmental Quality (EQ), Regional Economic Development (RED), and Other Social Effects (OSE). The formulation process must be conducted without bias as to structural and nonstructural measures.

Within the structure of the overall planning framework other more specific criteria relative to general policies, technical engineering, economic principles, social and environmental values, and local conditions must be established. These criteria, noted as "Technical," "Economic,"" and "Socioeconomic and Environmental" are as follows:

a. Technical Criteria.

(1) Assume that sideslopes of 2.5:1 are adequate for functional design of levees, berms, and riprapped creek banks during the reconnaissance phase

of the study. Verify this assumption, as appropriate, during the feasibility phase of the study.

(2) For levee plans considered during the reconnaissance phase of the study, assume that: (a) an acceptable borrow area that contains suitable semi-impervious material is within a 10-mile radius of the construction site; (b) foundation material at the proposed levee site will not present underseepage problems; (c) no consideration will be given to internal drainage; and (d) no consideration will be given to diverting overland flow originating outside the site. Investigate these facets in detail during the feasibility phase of the study, if levee plans are carried forward.

b. Economic Criteria.

(1) Tangible benefits should exceed project economic costs.

(2) Each separable unit of improvement or purpose should provide benefits at least equal to its cost unless justifiable on a noneconomic basis.

(3) Each plan, as ultimately formulated, should provide the maximum net benefits possible within the formulation framework.

(4) The costs for alternative plans of development should be based on preliminary layouts, estimates of quantities, and comparable unit prices.

(5) The benefits and costs should be in comparable economic terms to the fullest extent possible.

(6) A 50-year economic life is used for the economic evaluation of local protection plans and a 100-year economic life is used for the economic evaluation of dam/reservoir plans.

(7) The project evaluation period for local protection plans is a 50-year interval and for dam/reservoir plans is a 100-year interval beyond the estimated implementation date of 1995.

(8) The base case for comparison of alternative plans is the do-nothing ("no-action") plan.

(9) Assume that the rectification project at the mouth of the creek (i.e., lower the north berm of the harbor breakwater system) is implemented in early 1988 and alleviates 50 percent of the damages due to ice-jam flooding induced by the small-boat harbor project (i.e.; $44,500 annually).

c. Socioeconomic and Environmental Criteria.

The criteria for socioeconomic and environmental considerations in water resources planning are prescribed by the National Environmental Policy Act of 1969 (PL 91-190) and Section 122 of the River and Harbor Act of 1970, (PL 91-611). These criteria prescribe that all significant adverse and beneficial economic, social, and environmental effects of planned developments be considered and evaluated during plan formulation.

d. Design and Other Considerations.

(1) The procedures and data presented in the report entitled "Hydropower Cost Estimating Manual" (May 1979) prepared by the Portland District, Corps of Engineers, will be used to size and cost hydroelectric power generating facilities considered as an add-on feature to the basic dam/reservoir projects for flood control at Springville during the reconnaissance phase of the study. Investigate these facets in greater detail during the feasibility phase of the study if dam/reservoir plans are carried forward.

(2) Cost-Sharing - Project cost-sharing and financing, as specified in the Water Resources Development Act of 1986 (PL 99-662), is as follows:

(a) Flood Control (Structural) - Federal responsibilities include up to a maximum of 75 percent of the cost of the flood control project. NonFederal interests are required to: pay 5 percent of the cost of the project during construction; provide all lands, easements, rights-of-way and dredged material disposal areas; relocate all utilities; pay an additional amount during construction such that the total contribution of the nonFederal sponsor is equal to 25 percent of the cost of the project, if required; and operate and maintain the completed project. However, in no instance shall the nonFederal share exceed 50 percent of the cost of the project.

(b) Flood Control (Nonstructural) - Federal responsibilities include 75 percent of the cost of the project. NonFederal interests are required to provide all lands, easements, rights-of-way and dredged material disposal areas, and relocate all utilities up to a maximum of 25 percent of the cost of the project; pay an additional amount during construction such that the total contribution of the nonFederal sponsor is equal to 25 percent of the cost of the project, if required; and operate and maintain the project.

(c) Add-On Recreation - Federal responsibilities include 50 percent of the construction cost of separable project features. NonFederal interests are responsible for providing 50 percent of the cost of separable project features; and operating and maintaining the separable project features. Cost-sharing for the joint project features are as specified above.

(d) Add-On Hydroelectric Power - Local interests are required to repay 100 percent of the construction costs of the joint and separable project features and operate and maintain the completed project or reimburse the Federal Government for such costs.

(3) Local Sponsor - Formal assurances of local cooperation must be furnished by a municipality or other public agency fully authorized under State law to give such assurances and financially capable of fulfilling all items of local cooperation. The New York State Department of Environmental Conservation is the designated local sponsor for Corps-built flood control projects in New York State, and, as such, would be the local sponsor for any proposed flood control project in the Cattaraugus Creek Basin.

17. DEVELOPMENT OF PRELIMINARY ALTERNATIVE PLANS (POSSIBLE SOLUTIONS)

a. General.

Within the prescribed planning framework and established criteria, possible solutions were identified and evaluated in a two-stage iterative process to address the needs of the study area and the overall planning objectives. Each stage included the four functional planning tasks of problem identification, formulation of alternatives, impact assessment and evaluation. Each stage contained essentially the same sequence of tasks, but emphasis shifted as the process proceeded.

This paragraph presents the results of the reconnaissance phase evaluation. The level of study performed was consistent with the reconnaissance phase objective of evaluating a broad range of possible solutions and identifying the best general plan (or plans) for satisfying the flood control needs of the Cattaraugus Creek Basin and which warranted further detailed study.

The primary water resources need for which a solution is sought under this authority is to reduce flood damages in the Cattaraugus Creek Basin. As possible solutions to addressing this need, 9 preliminary alternatives, in addition to the "no-action" option, were initially formulated and assessed. These alternatives fell into two broad catagories: local protection plans in areas where a high concentration of flood damages exist (Sunset Bay and Arcade); and dam/reservoir plans at Springville. In addition, for the dam/reservoir plans developed at Springville, hydroelectric power generating facilities and recreation facilities were also considered to maximize the economic efficiency of the basic flood control plans.

b. Assessment, Evaluation and Comparison of Preliminary Alternative Plans.

Table 6, following, provides a brief description of the nine preliminary plans formulated to reduce flood damages and allied purposes in the Cattaraugus Creek Basin along with their estimated costs. The table also compares the economic and environmental impacts of these nine plans. The basis of comparison is the "No-Action" (do-nothing) Plan. For additional details, the reader is referred to the "Cattaraugus Creek, New York, Reconnaissance Report," March 1986.

c. Rationale for Selecting Plans for Further Detailed Study (Plans 3A, 3B, and 4).

The primary consideration used in selecting those plans to carry forward into the feasibility phase of the study was economic efficiency. As such, only those plans that had benefit-to-cost ratios greater than 1.0 were carried forward. These plans were Plans 3A and 3B, with benefit/cost ratios of 4.2 and 2.8, respectively. In addition, the "No-Action" Plan (Plan 4) was also carried forward as the basis of comparison.

d. Rationale for Eliminating Plans from Further Consideration (Plans 1A, 1B, 1C, 1D, 1E, 1F, and 2).

The primary consideration used in selecting those plans to eliminate from further consideration was economic efficiency. As such, all plans with benefit-to-cost ratios less than 1.0 were dropped from further consideration. These plans were Plans 1A, 1B, 1C, 1D, 1E, 1F, and 2 with benefit/cost ratios of 0.5, 0.5, 0.4, 0.5, 0.5, 0.4 and in the range of 0.1 to 0.3, respectively.

SECTION V
THE NATIONAL ECONOMIC DEVELOPMENT PLAN

The purpose of this section is to describe the National Economic Development (NED) Plan - Plan 3B(2)(Modified) (Modified Ice-Retention Structure with Fish Ladder) - including its components, estimated cost and benefits, and significant environmental impacts.

19. PLAN COMPONENTS

Plan 3B(2)(Modified), located just upstream of the town of Versailles (Creek Mile 11.0), would reduce damages due to ice-jam flooding in the Sunset Bay area at the mouth of the creek by about 60 percent. The layout and project features for Plan 3B(2)(Modified) are shown on Plate 10.

Components of Plan 3B(2)(Modified) include a 270-foot long ice-retention structure, 200-foot wide adjacent floodway, a fish ladder with sea lamprey control barrier and fisherman access facilities. The 270-foot wide ice-retention structure, conceptually designed by the Corps Cold Region Research and Engineering Laboratory, would be an 8-foot high reinforced concrete structure with ten reinforced concrete piers, spaced 25 feet apart, extending an additional five feet above the crest of the structure. Three gated low-flow openings would also be incorporated into the structure. These low-flow openings were sized to pass normal summertime flows without creating a pool behind the structure. In the event of a large summer storm, however, ponding would occur and the pool would be present for several days after the flood waters subside. A 25-foot wide concrete splash apron would also be constructed on the downstream side of the ice-retention structure. The concrete splash apron would inhibit erosion caused by water flowing over the crest of the structure. Further, to protect the structure from damage due to floating debris and to lessen the potential of debris clogging the low-flow openings, a debris boom would be placed in the upstream pool area.

The location of the ice-retention structure just upstream of the town of Versailles was selected primarily because it was the closest site to the area effected by ice-jam flooding (i.e., the Sunset Bay area at the mouth of the creek) that was also located off the Cattaraugus Reservation of the Seneca Nation of Indians. As previously stated, the Seneca Nation of Indians has repeatedly stated its opposition to any alternative plan that would require acquisition of reservation land. Further, the State of New York does not have the right to acquire reservation land under eminent domain. Therefore, a site off the Cattaraugus Reservation had to be selected for the proposed ice-retention structure. Since the area upstream of the town of Versailles is the closest site to the area effected by ice-jam flooding that is also located off the Cattaraugus Reservation, it was selected for the ice-retention structure. It should be noted, however, that since the ice-retention structure would be located 11 miles above the area effected by ice-jam flooding, and, thus, would not trap ice generated in the downstream area, it would not be 100-percent effective in reducing damages due to ice-jam flooding in the Sunset Bay area. Rather, it would reduce damages due to ice-jam flooding by about 60 percent.

Operation of the ice-retention structure would consist of partially closing the low-flow openings during the late fall or early winter ice-forming period (i.e., when the temperature of the creek water reaches about 35°F) for the purpose of forming a pool behind the structure. During the pool filling operation, the low-flow openings would be left partially open in order to allow some flow to pass the structure. Once a pool is formed, the gates would then be completely closed and water would flow over the crest of the ice-retention structure.

During the winter, a stable ice-cover would form in the pool area. This ice-cover, in conjunction with the ice-retention structure, would essentially block the flow of ice to downstream areas during the annual spring breakup and would cause an ice-jam to form in the pool area. In this manner, ice formed in the basin upstream of the project site (approximately 60 percent of the total ice formed in the basin) would be prevented from flowing downstream and jamming at the mouth of the creek. Once the threat of ice-jam flooding is over (late spring) the low-flow openings would be opened and the pool would be drained.

A 200-foot wide grass lined floodway (overflow channel), with a bottom elevation 2 feet higher than the crest elevation of the ice-retention structure, would also be constructed on the right bank of the creek adjacent to the ice-retention structure. This floodway would carry flow only during major runoff events, primarily when a pool is being maintained behind the ice-retention structure. The floodway is required because otherwise the high flow of the creek during these major runoff events could possibly break up the ice-jam behind the structure, thus allowing the trapped ice to be carried downstream where it could jam again. A 20-foot wide stone access road would also be constructed in the bottom of the floodway. This road would be used by construction equipment during annual maintenance operations, when debris and bedload material that becomes trapped behind the ice-retention structure is removed.

In order to prevent having the ice-retention structure act as a barrier to fish migration in Cattaraugus Creek, a fish ladder with a downstream resting pool approximately 100-feet long by 50-feet wide by 3-feet deep was also included as a plan component. This fish ladder, located adjacent to the ice-retention structure along the left bank of the creek, would be used by salmonids and possibly some warmwater fish species to transit the project site when the upstream pool is being maintained. In addition, a small fish-holding facility, approximately 10 feet by 10 feet, would be constructed at the upstream end of the fish ladder. This facility would allow NYSDEC to conduct special fisheries studies in the creek and the information gained would be used to make better management decisions on how to maintain and/or improve the creek's fisheries resource. Further, a sea lamprey control barrier - an 18-inch vertical jump - would be incorporated into the fish ladder to hinder migration of sea lamprey above the project site during their spring migration run, thereby potentially contributing to enhancement of the salmonid fisheries resource in the creek and in Lake Erie. However, to increase the maximum effectiveness of this barrier, the pool behind the ice-retention structure would be maintained until the end of June - the end of the sea lamprey migration run. Since the only way fish could migrate upstream while

the pool is being maintained would be via the fish ladder, upstream movement of sea lamprey would be severely hindered.

Fisherman access facilities were also added to the basic flood control plan. These facilities consist of a 15-car gravel parking lot, portable restroom facilities, and several gravel paths down to the creek. It is anticipated that these facilities would be extensively utilized during the spring and fall runs of salmon and trout.

Land requirements for the NED Plan would consist of fee acquisition of approximately 35 acres of land at the project site and a 1-year temporary easement on 10 acres in the vicinity of the project site for disposal of clean excavated material from initial construction. The 35 acres required at the project site includes an 18-acre pool area upstream of the ice-retention structure. This pool area encompases all land that would be flooded as a result of the project, including the area that would be flooded whenever an ice jam forms behind the structure. It should be noted that all land required for the NED Plan is located off the Cattaraugus Reservation.

Annual maintenance activities for this plan include maintaining the structural integrity of the ice-retention structure, mowing the grass lined overflow channel, and removing the debris trapped by the debris boom. In addition, the bedload material trapped behind the ice-retention structure (36,000 cubic yards per year) would also be removed. At the present time it is anticipated that this bedload material would be removed by a private contractor at no cost provided the contractor is permitted to keep the dredged material. Annual debris and bedload material removal operations would be limited to the months of July and August. Further, as the NED Plan would only reduce damages due to ice-jam flooding in the Sunset Bay area by 60 percent, a local flood warning and response plan should be developed and placed into operation, as needed. Components of this flood warning and response plan will be developed prior to implementation of the NED Plan if the NED Plan is constructed.

20. PLAN ACCOMPLISHMENTS

Plan 3B(2)(Modified) fulfills the planning objective of enhancing National Economic Development by reducing flood damages within the Cattaraugus Creek Basin. As such, damages due to ice-jam flooding in the Sunset Bay area at the mouth of the creek would be reduced by about 60 percent. However, because the project would be located 11-miles above the mouth of the creek - and thus would not trap ice generated in the downstream area (approximately 40 percent of the total ice formed within the basin) - damages due to ice-jam flooding would not be totally eliminated. Rather, damages due to ice-jam flooding would still occur although the frequency of such flooding and the magnitude of the resulting flood damages would be greatly reduced. It should also be noted that the plan would not reduce free-flow flood damages, nor would it alter the area designated as a flood plain for flood insurance purposes. In addition to reducing damages due to ice-jam flooding, Plan 3B(2)(Modified) also fulfills the planning objective of promoting the regions ability to meet its unfulfilled need for additional

recreational facilities with the addition of fisherman access facilities to the basic flood control project.

21. COST ESTIMATE

Tables 8 and 9 following, summarize the estimated project costs and annual charges and provide a breakdown of the Federal and nonFederal share of these costs for both the flood control and recreational fishing components of the project and for Plan 3B(2)(Modified) as a whole. These tabulations indicate that the total project cost for Plan 3B(2)(Modified) is $1,452,200 ($1,440,000 for the flood control component and $12,200 for the recreational fishing component), of which $1,086,100 is Federal and $366,100 is nonFederal on October 1986 price levels (Table 8). The total annual charges, including annual operation and maintenance costs, are $147,400 ($145,700 for the flood control component and $1,700 for the recreational fishing component) on October 1986 price levels, 8-7/8 percent interest rate and 50-year period of analysis (Table 9). It should be noted, however, that the annual cost to remove 36,000 cubic yards of bedload material trapped behind the ice-retention structure is not included in the above calculation as it is anticipated that this material would be removed by a local sand and gravel operator at no cost provided the contractor can keep the material.

22. ECONOMIC EVALUATION

Flood damage reduction benefits that would be realized as a result of implementation of Plan 3B(2)(Modified) total $167,800 annually, In addition, future costs to raise 12 structures in the Sunset Bay area would be avoided as it is anticipated that these property owners would elect not to raise their residences due to construction of a flood control project by the Corps of Engineers. These cost avoided benefits total $23,600 on an annual basis. Further, future costs to chemically treat Cattaraugus Creek for sea lamprey control upstream of Versailles ($13,300 annually) would be avoided and damage done by floating debris in Cattaraugus Harbor would be reduced by 50 percent (benefit of $2,500 annually). Recreational fishing benefits would also accure and would total $11,500 annually. It is also anticipated that construction of the project would employ currently unemployed local labor from the Cattaraugus Indian Reservation, which would result in area redevelopment benefits of $3,800 annually.

Table 10 following, summarizes the annual benefits, annual charges, average annual net benefits, and benefit-to-cost ratio for both the flood control and recreational fishing components of the project and for Plan 3B(2)(Modified) as a whole. Net benefits are $65,300 annually for the flood control component, $9,800 annually for the recreational fishing component and $75,100 annually for the project as a whole with benefit-to-cost ratios of 1.45, 6.76, and 1.51, respectively (October 1986 price levels, 8-7/8 percent interest rate and 50-year period of analysis).

Table 8 - Estimate of Total Project Cost for Alternative Plan 3B(2)(Modified)
(October 1986 Price Levels)

Item	Estimated Quantity	Unit	Unit Price ($/Unit)	Estimated Amount ($)
Flood Control Component				
1. Clearing and Grubbing	8	Acre	4190.00	33,520
2. Construct Access Road	2360	SY	18.00	42,480
3. Excavate Overflow Channel	46,660	CY	4.40	205,304
4. Excavate Control Structure	440	CY	8.30	3,652
5. Excavate for Fish Ladder	780	CY	8.30	2,324
6. Anchorage and Post Tensioning		LS		37,320
7. Concrete Ice Ret. Structure w/Forms & Resteel	920	CY	200.00	184,000
8. Concrete Fish Ladder w/ Resteel and Baffles	295	CY	235.00	69,325
9. Walkway		LS		17,600
10. Gates (Tainter w/Cable Hoists)	3	EA	76,000.00	228,000
11. Fert. Seed & Mulch	8	Acre	2,100.00	16,800
12. Trash Boom		LS		37,600
13. Excavate Resting Pool	560	CY	5.00	2,800
14. Construct Control House for Gates		LS		20,000
15. Maintenance Access Road		LS		34,900
Total Contractor's Earnings Less Contingencies				935,625
Contingencies @ 25% ±				234,375
Total Contractor's Earnings Plus Contingencies				1,170,000
Prepare DPR (Final Design)				75,000
Engineering and Design				60,000
Supervision and Administration				125,000
Lands (including 20% contingencies)		LS		10,000
First Cost				1,440,000
Federal Share (75%)				1,080,000
NonFederal Share (25%) (1)				360,000
Recreational Fishing Component				
1. Stone Parking Lot 150'X15'		LS		1,620
2. 10' Wide Gravel Paths		LS		4,700
3. Sanitary Facilities		LS		3,400
Subtotal				9,720
Contingencies @ 25%				2,480
First Cost				12,200
Federal Share (50%)				6,100
NonFederal Share (50%)				6,100
First Cost - Total Project				1,452,200
Federal Share				1,086,100
NonFederal Share				366,100
LERR				(10,000)
Cash				(356,100)

(1) Lands, easements, rights-of-way and dredge material disposal sites plus an additional cash contribution such that the total contribution of the nonFederal sponsor is equal to 25-percent of the cost of the project.

Table 9 - Estimate of Total Investment Cost and Annual Charges for Alternative Plan 3B(2)(Modified) (1)

Item	Project Costs ($)
Flood Control Component	
Project Cost, Excluding Lands	1,430,000
Interest During Construction (2)	36,000
Lands	10,000
Investment, Including Lands	1,476,000
Recreational Fishing Component	
Project Cost, Excluding Lands	12,200
Interest During Construction	0
Lands	0
Investment, Including Lands	12,200
Total Project	
Total Project Cost, Excluding Lands	1,442,200
Interest During Construction	36,000
Lands	10,000
Total Investment, Including Lands	1,488,200
Flood Control Component	
Interest and Amortization	132,900
Maintenance (3)	12,800
Annual Charges	145,700
Recreational Fishing Component	
Interest and Amortization	1,100
Maintenance	600
Annual Charges	1,700
Total Project	
Interest and Amortization	134,000
Maintenance (3)	13,400
Total Annual Charges	147,400

(1) October 1986 price levels, 8-7/8 percent interest rate and 50-year period of analysis.

(2) 8-month construction period.

(3) Does not include cost to remove 36,000 cubic yards of sediment annually. It is anticipated that this material would be removed by a local sand and gravel operator at no cost provided the contractor can keep the material.

Table 10 - Summary of Benefits and Costs for Alternative Plan 3B(2)(Modified) (1)

	Average Annual Benefits ($/yr)	Average Annual Charges ($/yr)	Net Average Annual Benefits ($/yr)	Benefit/ Cost Ratio
Flood Control Component	211,000	145,700	65,300	1.45
Recreational Fishing Component	11,500	1,700	9,800	6.76
Total Project	222,500	147,400	75,100	1.51

(1) October 1986 price levels, 8-7/8 percent interest rate and 50-year period of analysis.

23. ENVIRONMENTAL ASSESSMENT

An analysis of the environmental impacts of the NED Plan, Plan 3B(2)(Modified), was included in the Draft Environmental Impact Statement included with the Draft FFR. In addition, a Draft Section 404(b)(1) Evaluation and Public Notice, that addressed fill material to be placed into Cattaraugus Creek, was also prepared and was included in the Draft FFR as Enclosure 3. In summary, the analysis indicated that the most significant potential negative environmental impact of the project would be blockage of salmon and trout migration runs to spawning streams above the project site. However, a fish ladder with holding tank has been included as a plan component to mitigate for this potential negative impact. Further, installation of a sea lamprey control barrier in the fish ladder would significantly hinder upstream spawning runs of sea lamprey, thereby potentially enhancing the salmon and trout fisheries resource in the creek as well as Lake Erie. Temporary degradation of water quality due to turbidity caused during in-stream construction and annual maintenance activities would also occur. Further, when the pool behind the ice-retention structure is being maintained, existing riffle areas within the pool area would be temporarily altered due to increased water depths and accumulation of bedload material. In addition, construction of the ice-retention structure would alter the free flowing condition of the creek, thus, disqualifying this section of Cattaraugus Creek from the Nationwide Rivers Inventory and from future consideration for study or possible designation as a Wild and Scenic River. No displacement of persons or farms would occur due to implementation of the plan. Further, there would be no adverse impacts to endangered species and/or known cultural resources.

The NED Plan would substantially reduce damages due to ice-jam flooding in the Sunset Bay area at the mouth of the creek. It would also have a minor, long-term positive impact on property values and tax revenues in this area. Plan 3B(2)(Modified) would also provide additional recreational fishing opportunities for area fishermen by providing improved access and parking facilities.

SECTION VI
LOCAL VIEWS AND COMMENTS ON THE NED PLAN

The primary purpose of this section is to provide a summary of the views and comments expressed as a result of public review of the NED Plan.

24. LOCAL VIEWS AND COMMENTS ON THE NED PLAN

As previously stated, the Draft Final Feasibility Report identified the NED Plan - Plan 3B(2)(Modified) - as the Tentatively Selected Plan. This designation was based on the fact that the plan was economically justified and environmentally viable. Being the NED Plan, it was also the plan that maximized average annual net benefits consistent with protecting the Nation's environment. Therefore, based on the above, the NED Plan was designated as the Tentatively Selected Plan.

As discussed in Section I of the Main Report, the Draft Final Feasibility Report, including its tentative recommendation to implement the NED Plan - Plan 3B(2)(Modified) - was coordinated with Federal, State, and local agencies and the general public and their input into the plan selection process was solicited. This coordination was accomplished through distribution of the Draft FFR and Draft EIS, a 45-day NEPA review of the Draft Environmental Impact Statement, and a Public Information/Section 404 Public Hearing held in the town of Versailles on October 15, 1987. A summary of the views and comments expressed as a result of this coordination is provided below.

a. Federal Interests

(1) Congressman Amo Houghton, 34th District, New York requested that the proposed project be held up until the personal implications of the project were fully analyzed.

(2) The U.S. Fish and Wildlife Service, in their Coordination Act Report dated May 19, 1987, supplemented with a revised recommendation on July 15, 1987, recommended the inclusion of a fish ladder with resting pool in the design of the NED Plan; that construction of the project features within the creek not be initiated until July 1 and that at least one-half of the creek be open at all times; that annual maintenance operations be limited to the period July 1 to August 31; that no sand, gravel or other debris removed from the project site be disposed of, or stockpiled, in waters or wetlands of the U.S.; and that all costs for mitigation of negative environmental impacts be treated in the same manner as other project costs. All recommendations of the USF&WS were incorporated into the NED Plan.

(3) The U.S. Department of the Interior, Office of Environmental Review provided technical review comments on the Draft FFR and Draft EIS and suggested several additional areas of concern that should be addressed in the Final EIS.

(4) The U.S. National Park Service expressed opposition to the project because it would destroy the creek's free flowing condition, thus, disqualifying portions of the creek from the Nationwide Rivers Inventory and from future consideration for study or possible designation under the provisions of the National Wild and Scenic Rivers Act. They also requested that a

meeting be held to consider alternatives. Such a meeting was held on May 20, 1987. At this meeting, it was noted that there were no economically feasible alternatives to the proposed action. Further, the proposed ice-retention structure could not be relocated to a site outside the reach of the creek included in the Nationwide Rivers Inventory. Locating the structure outside this reach of the creek (i.e., upstream of Gowanda) would place the structure so far upstream of the damage area that it would not be effective in reducing damages due to ice-jam flooding. Thus, it was concluded that there were no feasible alternatives to the proposed action.

(5) The U.S. Departmetn of Agriculture, Soil Conservaiton Service and the U.S. Department of Transportation, Federal Highway Administration had no comments or suggestions on the Draft FFR and Draft EIS.

b. Seneca Nation of Indians

The Seneca Nation of Indians oppose implementation of the NED Plan because it would increase downstream erosion; because of the loss of gravel downstream of the project which they currently mine; because of the negative impacts to the creek's fishery resources; and because they believe the project would pose a flood threat to their land upstream of the project.

c. State and Local Governments and Agencies

(1) The New York State Department of Environmental Conservation, the local sponsor for all Corps-built flood control projects in New York State, does not support implementation of the NED Plan and will not provide the required items of local cooperation. Among the reasons for their position are: the 60 percent reduction in ice-jam flooding damages at the mouth of the creek is unlikely with the ice-retention structure located 11 miles upstream; opposition by two counties, the town of Perrysburg and numerous groups and individuals; the negative impacts on the creek's fishery resources; and the DEC Division of Lands and Forests request that no commitment to the project beyond completion of the current study be made until they complete their assessment and prioritization of streams in New York on the National Inventory, especially since Cattaraugus Creek is expected to rank high on the priority list for designation as a wild and scenic river.

(2) Chautauqua, Cattaraugus, and Erie Counties oppose implementation of the NED Plan based, in part, on the following: significant opposition to the plan as expressed by local individuals and groups; adverse impacts to the creek's fishery resources; and because the proposed solution is located 11 miles upstream of the area that it is trying to protect. They also suggested that alternative solutions to reducing damages due to ice-jam flooding at the mouth of the creek be considered.

(3) The village of Gowanda and the towns of Perrysburg and Collins oppose implementation of the NED Plan for similar reasons as those expressed by the counties of Chautauqua, Cattaraugus, and Erie. They also question the effectiveness of the project; object to the adverse impacts of the annual gravel and debris removal operations on the quiet residential area of Versailles and the damage it would cause to area roads; oppose the loss of local land for the project; and believe the project would pose a flood threat to upstream communities.

(4) The town of Hanover located at the mouth of Cattaraugus Creek opposes implementation of the NED Plan because they could not assume financial responsibility for annual operation and maintenance expenses and because they do not want to burden an upstream area with their problems. They also requested that a solution to the ice-jam flooding problem be implemented at the mouth of the creek.

d. Local Groups and Organizations

(1) The Versailles Volunteer Fire Company opposes implementation of the NED Plan because of the added burden it would impose on the fire company in terms of public safety; the tax dollars that would be needed to maintain access roads would pose a burden to the town of Perrysburg; and the serious difficulties they would experience in drawing water from the creek for fire fighting purposes if the project was implemented.

(2) The Trinity United Church of Christ opposes implementation of the NED Plan because there are too many uncertainties concerning the impacts of the project; the additional cost that would be borne by local municipalities· their belief that the project would induce upstream flooding; and because the project would upset the ecological balance of the area.

(3) The Gowanda area Chamber of Commerce opposes implementation of the NED Plan because of their belief that the project would induce upstream flooding and because of the negative impacts to the creek's fishery resources.

(4) The Sierra Club and Trout Unlimited oppose implementation of the NED Plan because of the negative environmental impacts, especially to the creek's fishery resources and because they question the effectiveness of the project. They also suggest that non-structural solutions be implemented.

(5) The Cattaraugus Creek Anti-Dam Association, an organization of local interests, opposes implementation of the NED Plan for reasons similar to those expressed by the village of Gowanda and the towns of Perrysburg and Collins.

e. General Public

Numerous comments were received from the general public. By far, the majority of the comments received were opposed to implementation of the NED Plan for reasons similar to those stated by the village of Gowanda and the towns of Perrysburg and Collins. The three local individual property owners who would be effected by the project also object to loss of their land.

SECTION VII
DESIGNATION OF THE SELECTED PLAN

25. DESIGNATION OF THE SELECTED PLAN

As previously discussed, the Draft Final Feasibility Report identified the NED Plan - Plan 3B(2)(Modified) - as the Tentatively Selected Plan. However, governmental, agency, and public review of this tentative recommendation indicated intense and widespread opposition to implementation of this plan. In addition, the communities that would benefit from the project (counties of Chautauqua and Erie, the town of Hanover and the Seneca Nation of Indians) as well as the communities where the NED Plan would be located (counties of Erie and Cattaraugus and the town of Versailles) also oppose implementation of this plan. Local interests also requested that a solution to the ice-jam flooding problem be implemented in the vicinity of the problem area (i.e., at the mouth of the creek). However, the only economically justified solution to the ice-jam flooding problem at the mouth of the creek involves an ice-retention structure as a plan component. Further, because of the opposition of the Seneca Nation of Indians to selling or leasing reservation land for any flood control project, the ice-retention structure must be located upstream of the town of Versailles. Thus, there is no solution to the ice-jam flooding problem at the mouth of the creek in the vicinity of the problem area that can be recommended by the Corps of Engineers. Further, the local sponsor for any Corps-built flood control project in New York State is the New York State Department of Environmental Conservation. However, they do not support implementation of the NED Plan and would not furnish the required items of local cooperation. Therefore, based on the above, the Selected Plan is Alternative Plan 4 - The "No-Action" Plan. It should be noted, however, that this recommendation does not effect the proposed rectification project at the mouth of the creek (i.e., lowering the north berm of the Cattaraugus Creek Harbor breakwater system). This project will be implemented in early 1988 provided that a right-of-entry is obtained from the Seneca Nation of Indians.

SECTION VIII
CONCLUSIONS

The primary purpose of this section is to provide a summary of the significant conclusions reached during the Cattaraugus Creek Study.

26. CONCLUSIONS

Cattaraugus Creek is about 70 miles long and drains an area of about 558 square miles of Western New York as shown on Figure 1. The creek rises in the Appalachian plateau in Western New York and flows in a westerly direction to its mouth in Lake Erie, 25 miles southwest of Buffalo, New York. Terrain of the basin varies from the hilly, steep-sloped and narrow valleyed portion of the basin upstream of Gowanda to the flat-sloped and wide-valleyed Lake Erie plain downstream of Gowanda.

The Cattaraugus Creek Basin is predominantly rural; however, the main branch of the creek passes through the villages of Arcade, Gowanda, and Springville. The lower 16 miles of the creek also flows through the Cattaraugus Indian Reservation. The main tributaries of the creek include Clear Creek at Arcade, Elton Creek, Buttermilk Creek, Spring Brook, Spooner Creek, South Branch Cattaraugus Creek, and Clear Creek at Iroquois.

The primary water resources need for which a solution was sought under this authority was to reduce flood damages within the Cattaraugus Creek Basin. In addition, for dam/reservoir plans that were developed, the addition of hydroelectric power generating facilities and recreation facilities were also considered to maximize the economic efficiency of the basic flood control plans. As possible solutions, nine preliminary alternatives, and 11 additional detailed alternatives, in addition to the "No-Action" option, were formulated and assessed. These alternatives fell into two broad categories: structural and nonstructural local protection plans in areas where a high concentration of flood damages exist (Sunset Bay area and Arcade); and dam/reservoir plans at Springville. The main conclusions of this formulation and assessment process were:

a. Local protection plans in the village of Arcade were not economically justified and were eliminated from further consideration.

b. Dam/reservoir plans in Springville were not economically justified and were eliminated from further consideration.

c. Nonstructural plans in the Sunset Bay area were not economically justified and were eliminated from further consideration.

d. Of the local protection plans considered to reduce damages due to ice-jam flooding in the Sunset Bay area, only alternatives that included an ice-retention structure located above the town of Versailles as a plan component were economically justified. Therefore, all other plans were eliminated from further consideration.

e. Of the local protection plans considered to reduce damages due to ice-jam flooding in the Sunset Bay area that included an ice-retention structure located above the town of Versailles as a plan component, the plan that reasonably maximized NED benefits consistent with protecting the Nation's environment was Alternative Plan 3B(2)(Modified) and, as such, was designated the NED Plan.

f. Local interests oppose implementation of the NED Plan, or any plan that includes an ice-retention structure located above the town of Versailles as a plan component. In addition, the New York State Department of Environmental Conservation, the local sponsor for all Corps-built flood control projects in New York State, does not support implementation of such a plan and would not furnish the required items of local cooperation. Therefore, the Selected Plan is Alternative Plan 4 - The "No-Action" Plan.

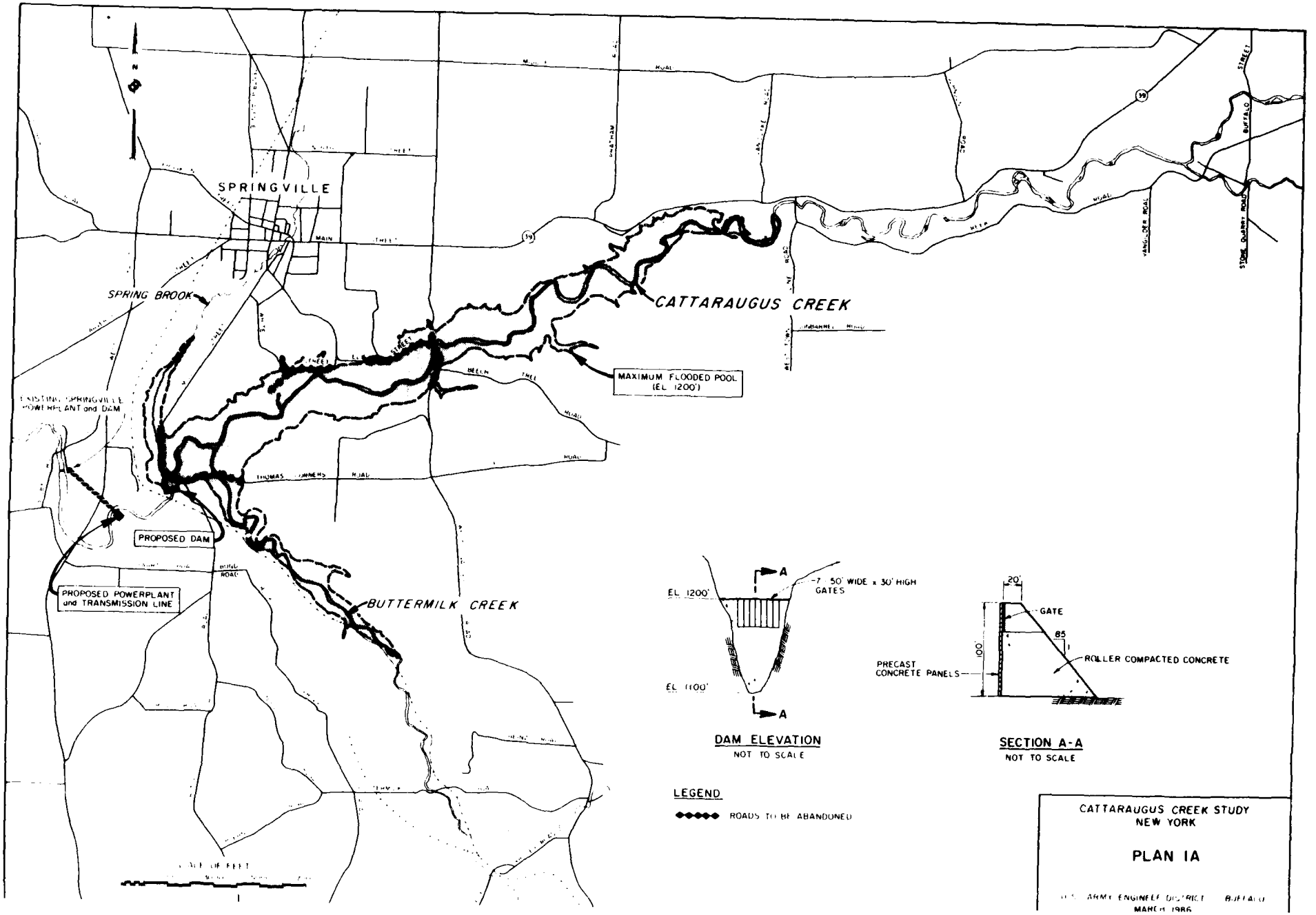
SECTION IX
RECOMMENDATIONS

27. RECOMMENDATIONS

After consideration of environmental, social and economic effects as well as engineering feasibility, I have concluded that the best plan for accomplishing the planning objectives of reducing flood damages in the Cattaraugus Creek Basin and promoting the region's ability to meet its unfulfilled need for additional recreational facilities is Alternative Plan 3B(2)(Modified) - Modified Ice-Retention Structure with Fish Ladder. However, because this plan is socially unacceptable and lacks the support of the New York State Department of Environmental Conservation, the agency that would provide the required items of Local Cooperation for the project, and considering that there is no other plan that meets the requirements of the Water Resources Council's "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies," I recommend the "No-Action" (Do-Nothing) Plan as the recommended course of action. I further recommend that this study be terminated.

Daniel R. Clark

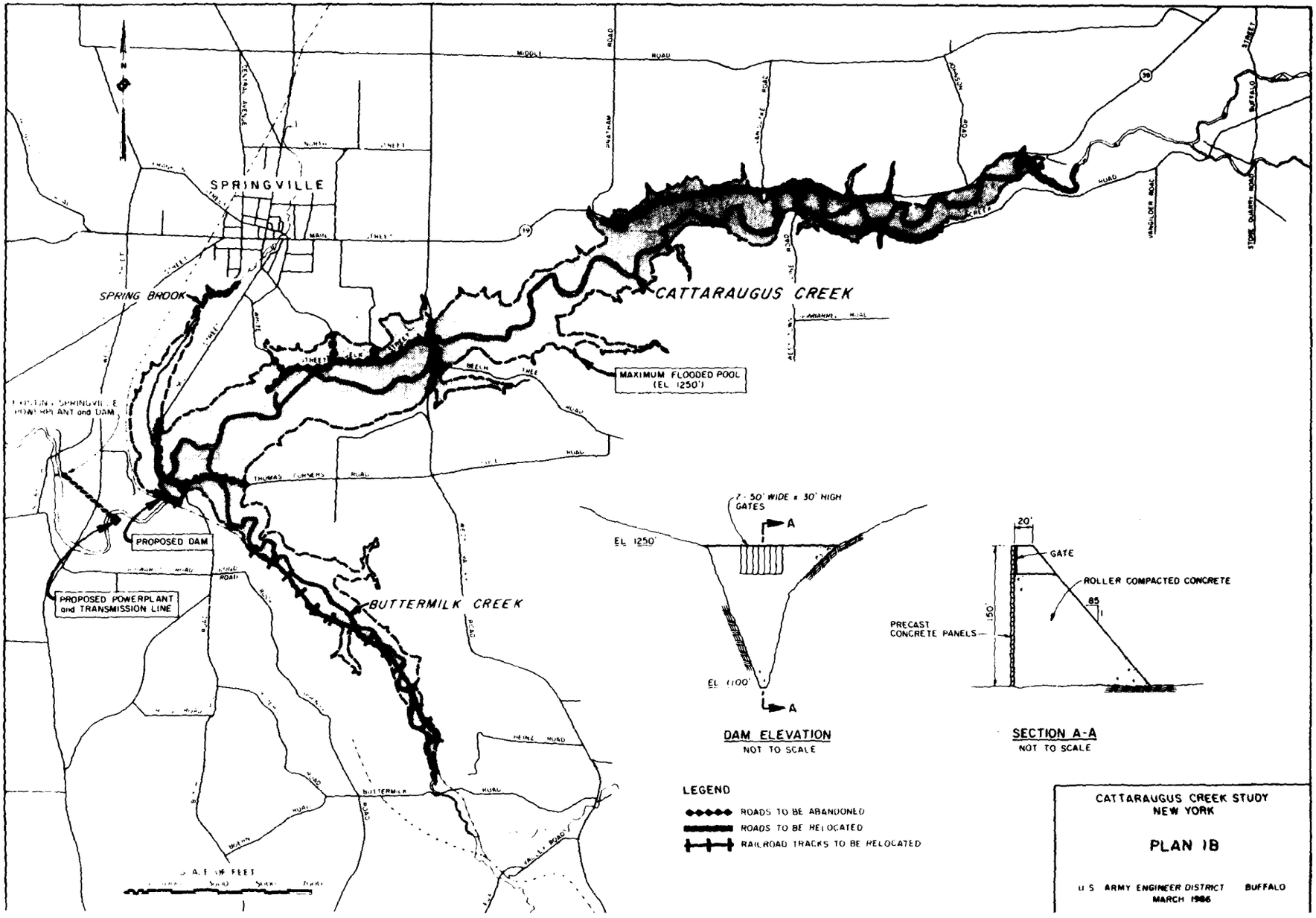
DANIEL R. CLARK
Colonel, U.S. Army
Commanding

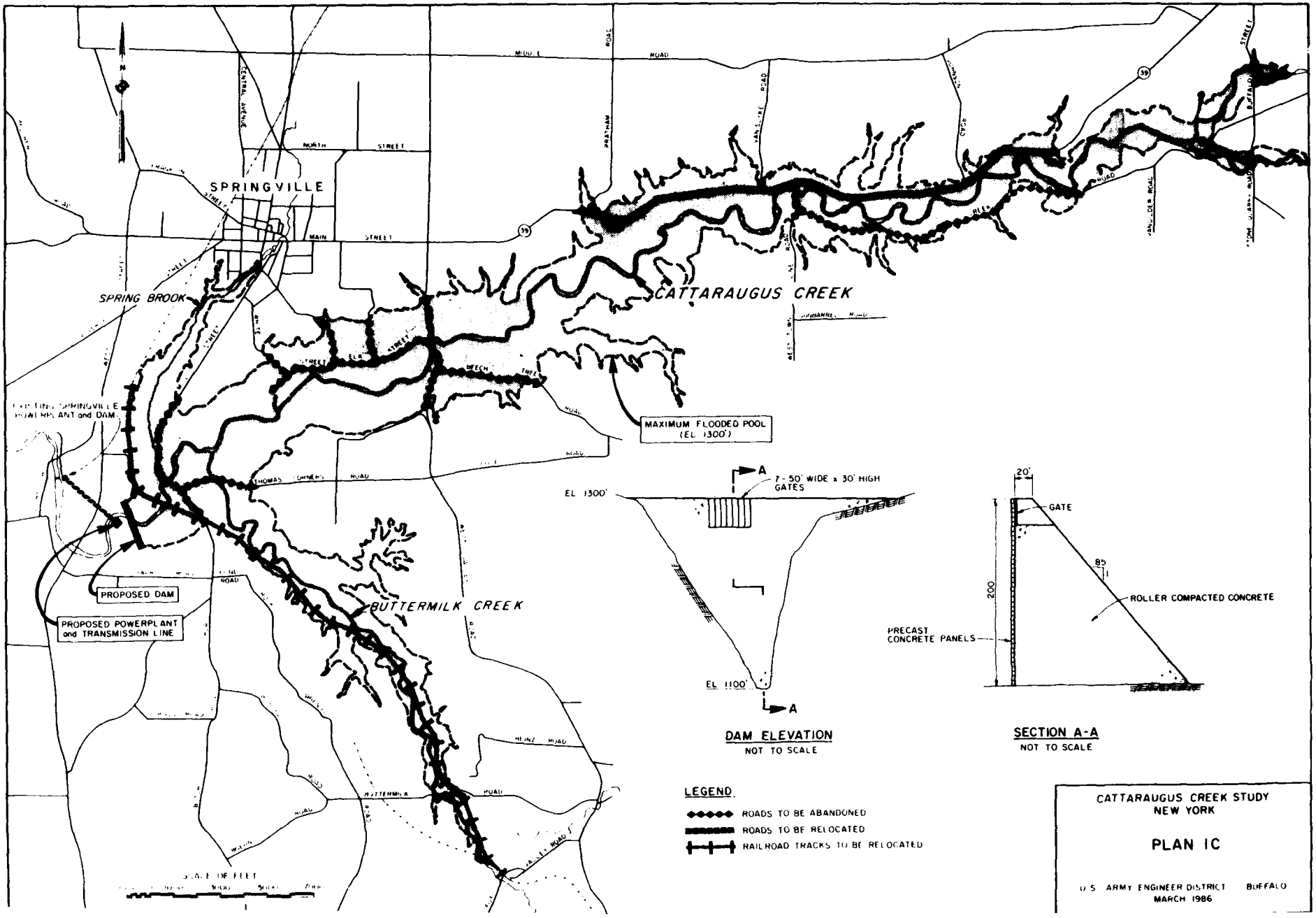


CATTARAUGUS CREEK STUDY
NEW YORK

PLAN IA

U.S. ARMY ENGINEER DISTRICT BUFFALO
MARCH 1986


SPRINGVILLE
SPRING BROOK
CATTARAUGUS CREEK
BUTTERMILK CREEK
MAXIMUM FLOODED POOL (EL 1250')
PROPOSED DAM
PROPOSED POWERPLANT and TRANSMISSION LINE
EXISTING SPRINGVILLE HYDROPLANT and DAM
MIDDLE ROAD
MAIN STREET
THOMAS CUNNEEN ROAD
BUTTERMILK ROAD
VANSLYCK ROAD
STONE QUARRY ROAD
BUFFALO STREET
7 - 50' WIDE x 30' HIGH GATES
EL 1250'
EL 1100'
A
A
DAM ELEVATION
NOT TO SCALE
20'
GATE
ROLLER COMPACTED CONCRETE
85
1
150'
PRECAST CONCRETE PANELS
SECTION A-A
NOT TO SCALE
LEGEND
ROADS TO BE ABANDONED
ROADS TO BE RELOCATED
RAILROAD TRACKS TO BE RELOCATED
CATTARAUGUS CREEK STUDY
NEW YORK
PLAN 1B
U S ARMY ENGINEER DISTRICT BUFFALO
MARCH 1986



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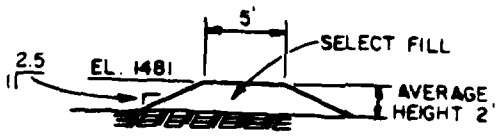
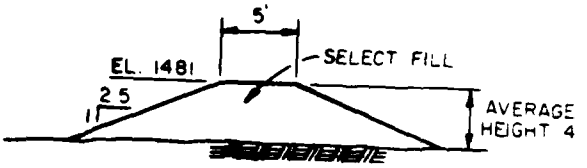
MARCH 1986

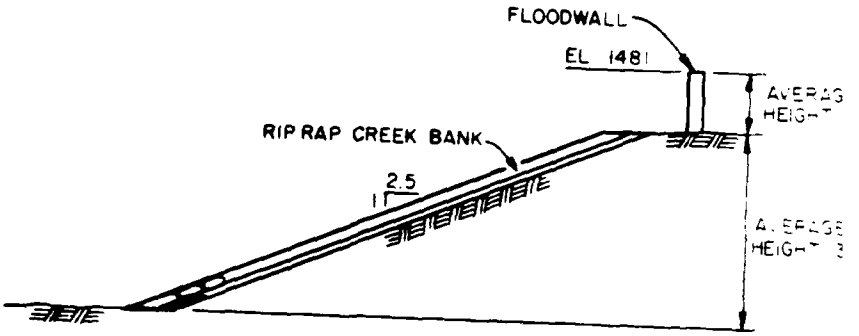


TYPICAL BERM SECTION

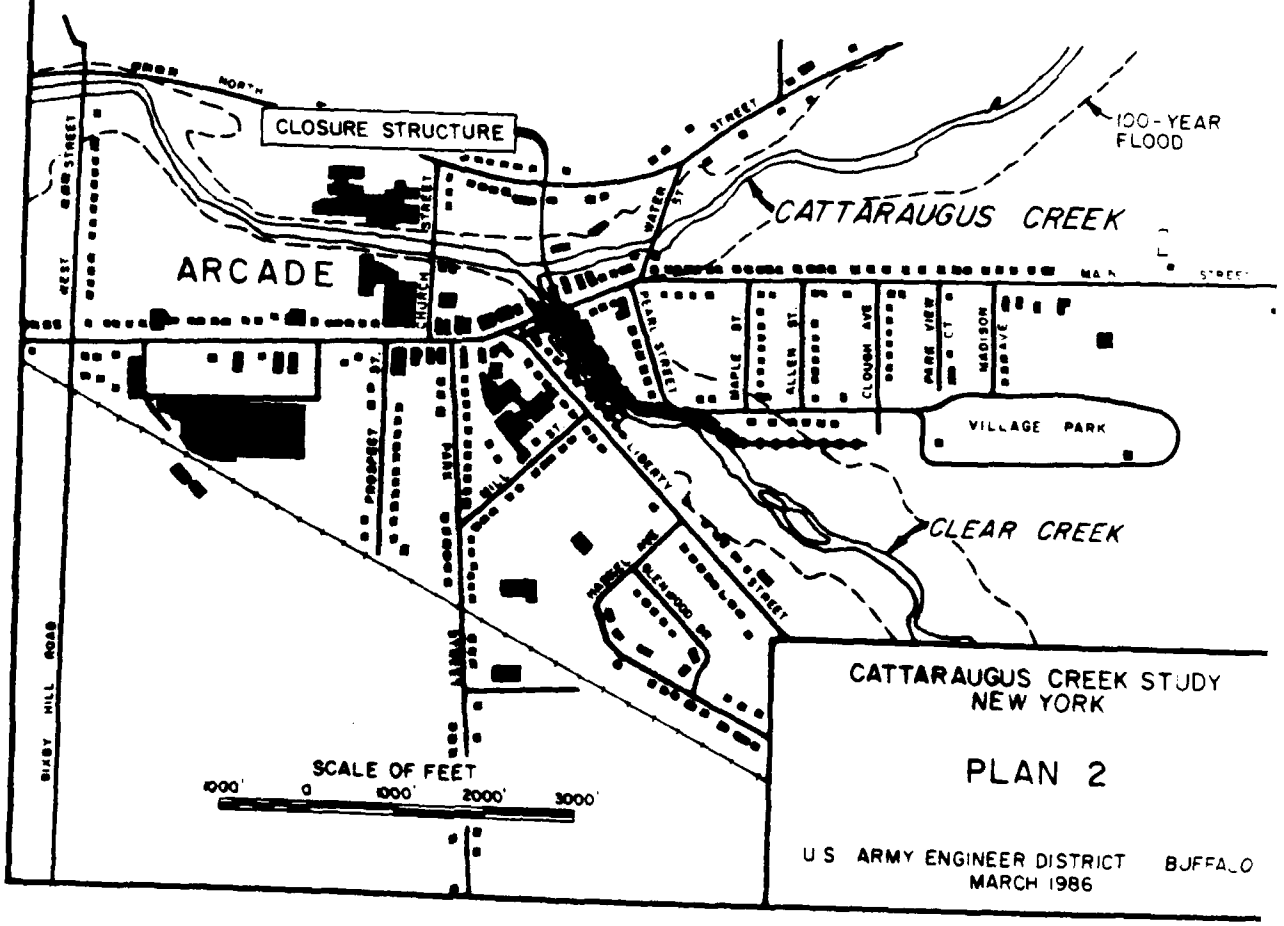


TYPICAL LEVEE SECTION

LEGEND:
- BERM
- FLOODWALL
- LEVEE



TYPICAL FLOODWALL SECTION

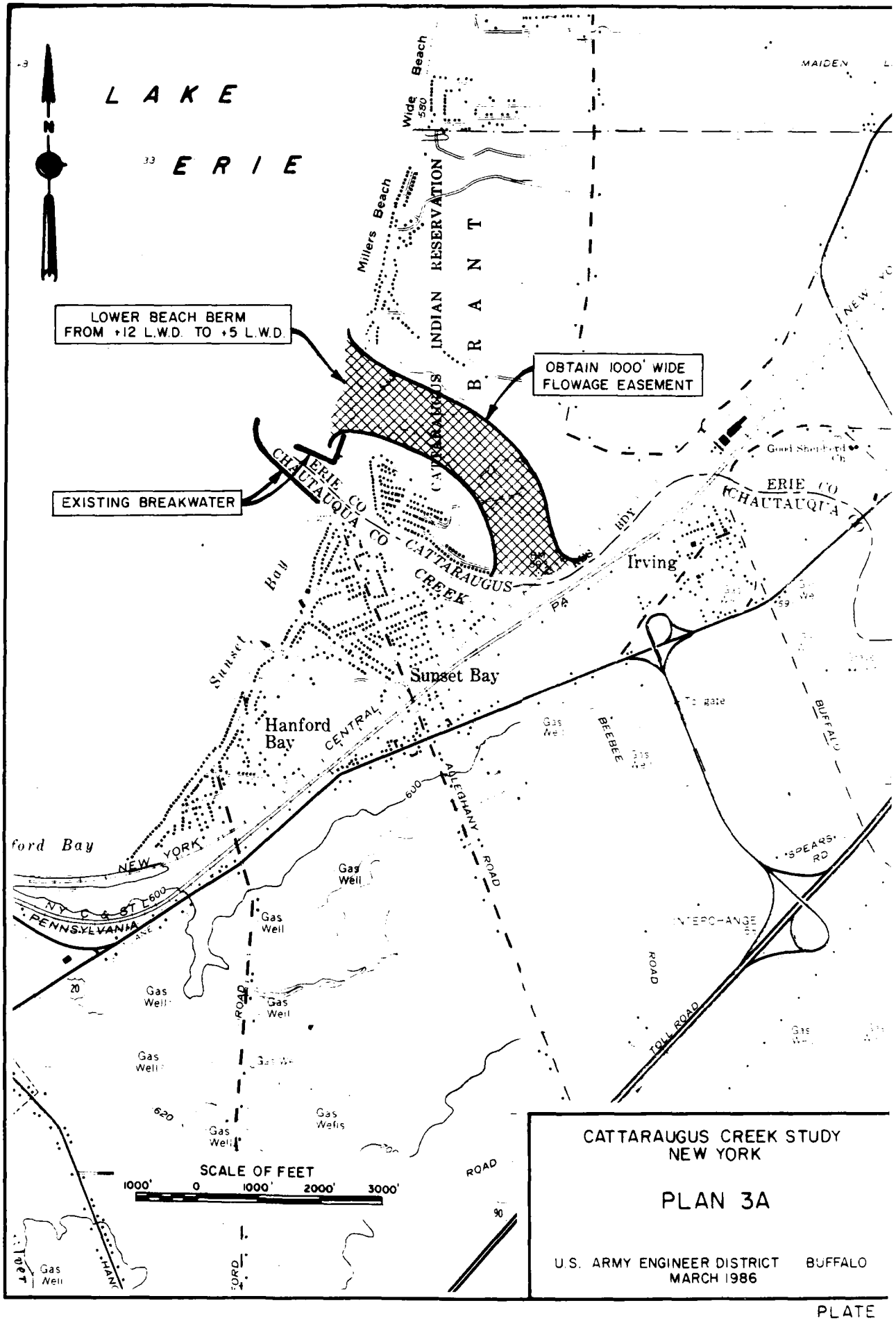


CATTARAUGUS CREEK STUDY
NEW YORK

PLAN 2

U S ARMY ENGINEER DISTRICT BUFFALO
MARCH 1986

PLATE

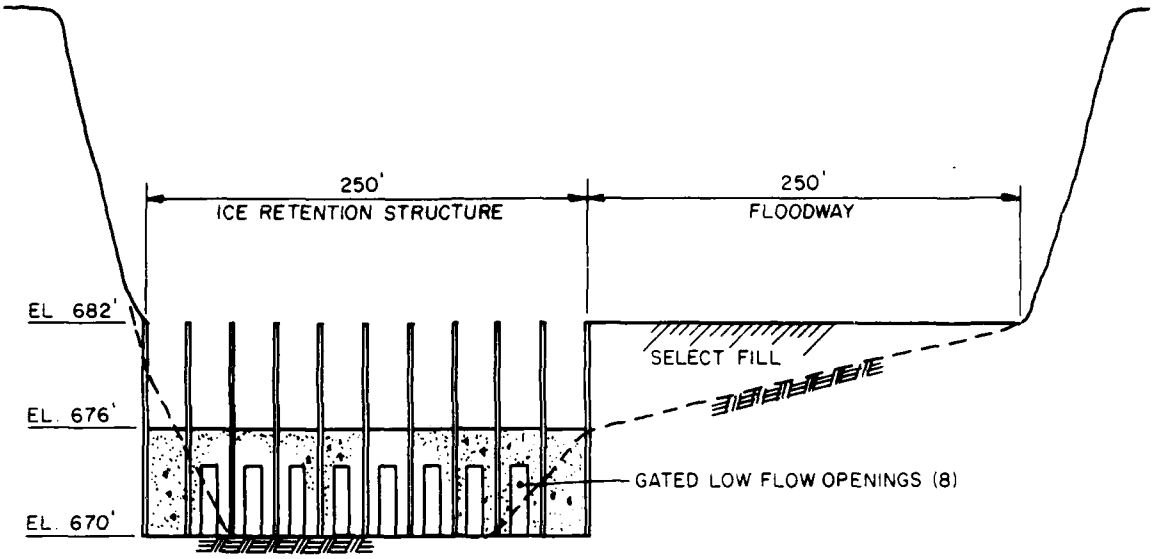


CATTARAUGUS CREEK STUDY
NEW YORK

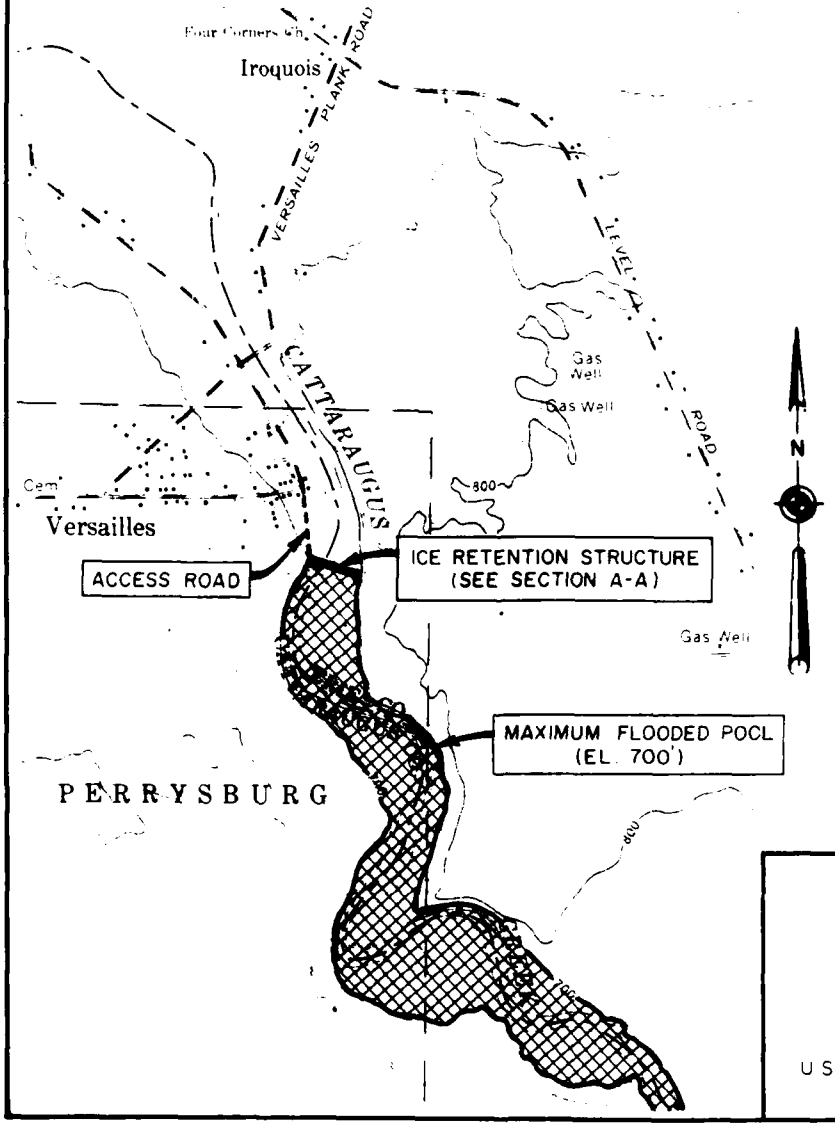
PLAN 3A

U.S. ARMY ENGINEER DISTRICT BUFFALO
MARCH 1986

PLATE



SECTION A-A



CATTARAUGUS CREEK STUDY
NEW YORK

PLAN 3B

U S ARMY ENGINEER DISTRICT BUFFALO
MARCH 1986

PLATE 6

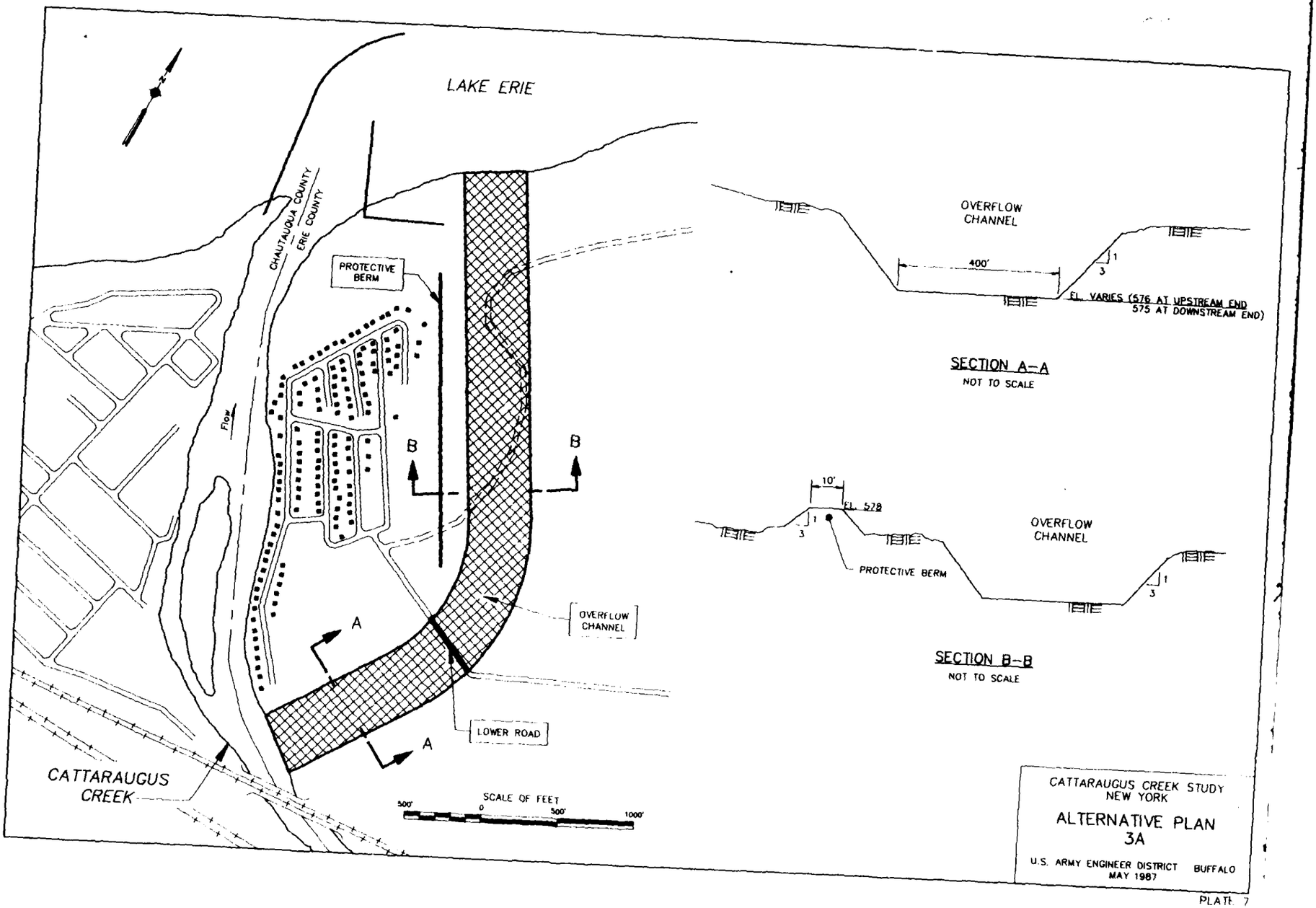

LAKE ERIE
CHAUTAUQUA COUNTY
ERIE COUNTY
PROTECTIVE BERM
Flow
B
B
A
A
OVERFLOW CHANNEL
LOWER ROAD
CATTARAUGUS CREEK
SCALE OF FEET
500'
0
500'
1000'
OVERFLOW CHANNEL
400'
3
1
EL. VARIES (576 AT UPSTREAM END
575 AT DOWNSTREAM END)
SECTION A-A
NOT TO SCALE
10'
EL. 578
3
1
OVERFLOW CHANNEL
PROTECTIVE BERM
3
1
SECTION B-B
NOT TO SCALE
CATTARAUGUS CREEK STUDY
NEW YORK
ALTERNATIVE PLAN
3A
U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 1987

PLATE 7

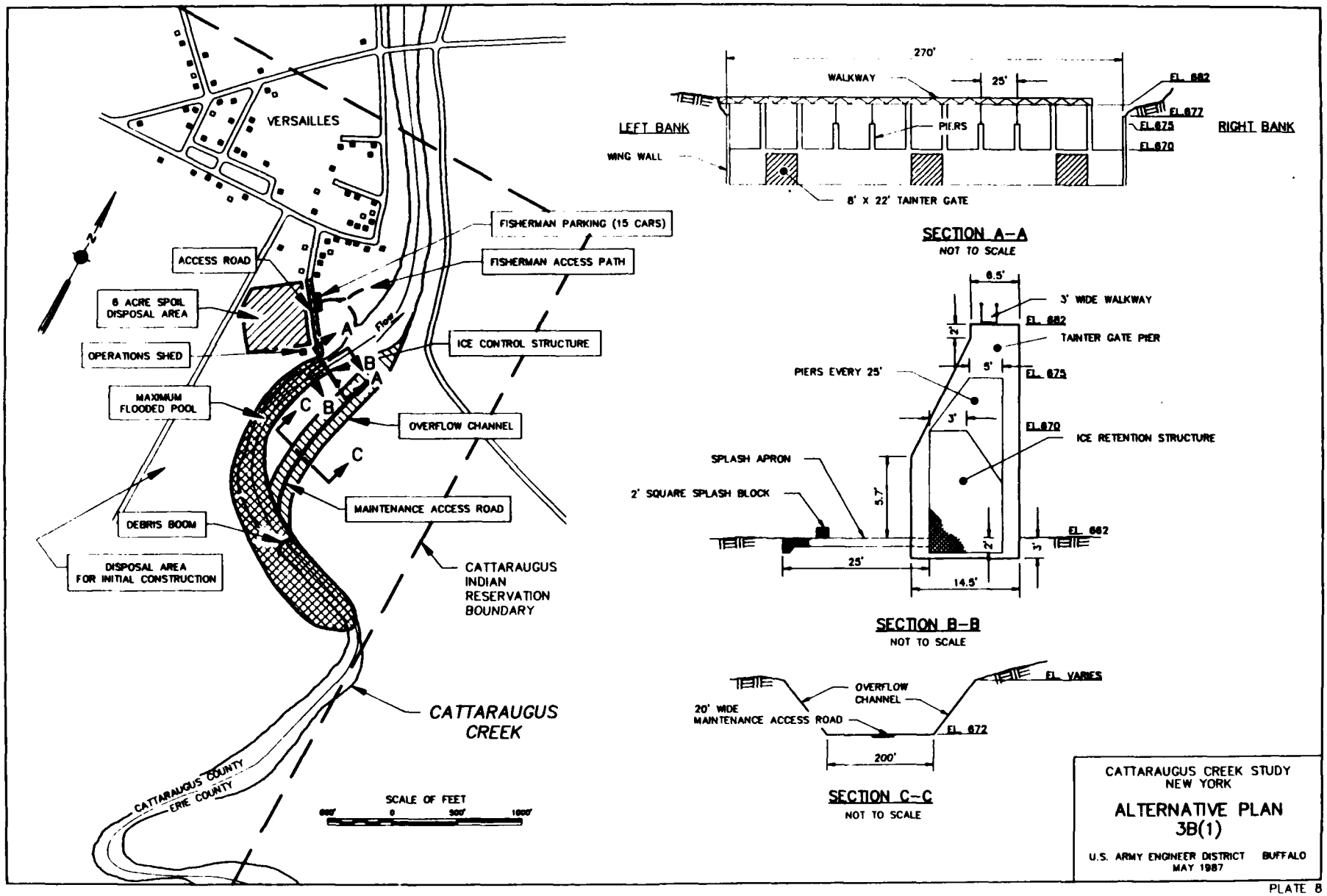

VERSAILLES
FISHERMAN PARKING (15 CARS)
FISHERMAN ACCESS PATH
ACCESS ROAD
6 ACRE SPOIL DISPOSAL AREA
OPERATIONS SHED
ICE CONTROL STRUCTURE
MAXIMUM FLOODED POOL
OVERFLOW CHANNEL
MAINTENANCE ACCESS ROAD
DEBRIS BOOM
DISPOSAL AREA FOR INITIAL CONSTRUCTION
CATTARAUGUS INDIAN RESERVATION BOUNDARY
CATTARAUGUS CREEK
CATTARAUGUS COUNTY
ERIE COUNTY
SCALE OF FEET
A
B
C
Flow
270'
WALKWAY
25'
EL. 682
EL. 677
EL. 675
EL. 670
LEFT BANK
RIGHT BANK
PIERS
WING WALL
8' X 22' TAINTER GATE
SECTION A-A
NOT TO SCALE
6.5'
3' WIDE WALKWAY
TAINTER GATE PIER
PIERS EVERY 25'
5'
3'
ICE RETENTION STRUCTURE
SPLASH APRON
2' SQUARE SPLASH BLOCK
5.7'
25'
14.5'
SECTION B-B
NOT TO SCALE
OVERFLOW CHANNEL
EL. VARIES
20' WIDE MAINTENANCE ACCESS ROAD
EL. 672
200'
SECTION C-C
NOT TO SCALE
CATTARAUGUS CREEK STUDY
NEW YORK
ALTERNATIVE PLAN
3B(1)
U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 1987

PLATE 8

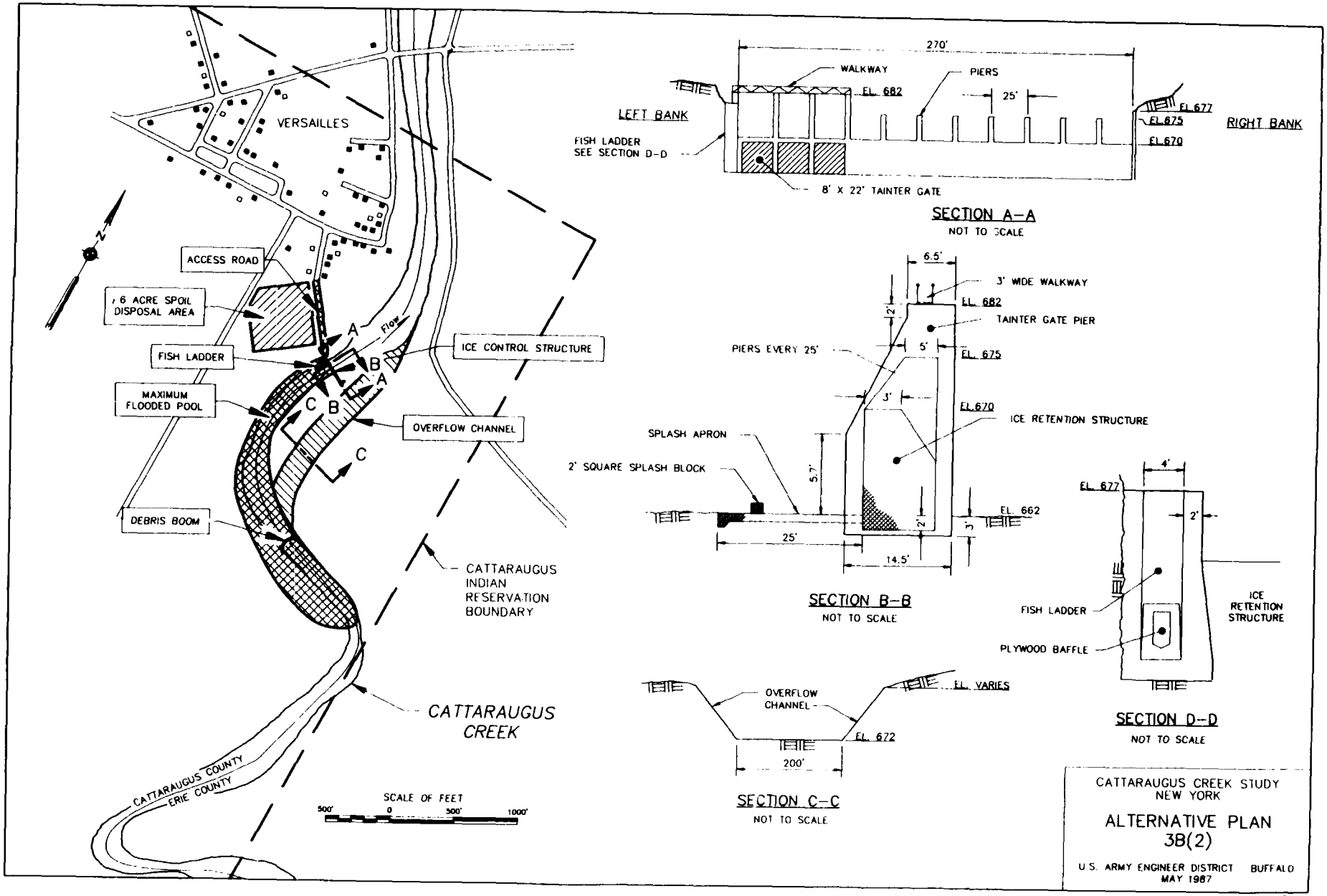

VERSAILLES
ACCESS ROAD
6 ACRE SPOIL DISPOSAL AREA
FISH LADDER
MAXIMUM FLOODED POOL
DEBRIS BOOM
ICE CONTROL STRUCTURE
OVERFLOW CHANNEL
Flow
A
B
C
CATTARAUGUS INDIAN RESERVATION BOUNDARY
CATTARAUGUS CREEK
CATTARAUGUS COUNTY
ERIE COUNTY
SCALE OF FEET
500' 0 500' 1000'
270'
WALKWAY
PIERS
EL. 682
25'
EL. 677
EL. 675
EL. 670
LEFT BANK
RIGHT BANK
FISH LADDER SEE SECTION D-D
8' X 22' TAINTER GATE
SECTION A-A
NOT TO SCALE
6.5'
3' WIDE WALKWAY
EL. 682
TAINTER GATE PIER
2'
5'
EL. 675
PIERS EVERY 25'
3'
EL. 670
ICE RETENTION STRUCTURE
SPLASH APRON
2' SQUARE SPLASH BLOCK
5.7'
EL. 662
3'
2'
25'
14.5'
SECTION B-B
NOT TO SCALE
OVERFLOW CHANNEL
EL. VARIES
EL. 672
200'
SECTION C-C
NOT TO SCALE
4'
EL. 677
2'
FISH LADDER
ICE RETENTION STRUCTURE
PLYWOOD BAFFLE
SECTION D-D
NOT TO SCALE
CATTARAUGUS CREEK STUDY
NEW YORK
ALTERNATIVE PLAN
3B(2)
U.S. ARMY ENGINEER DISTRICT BUFFALO
MAY 1987

PLATE 9

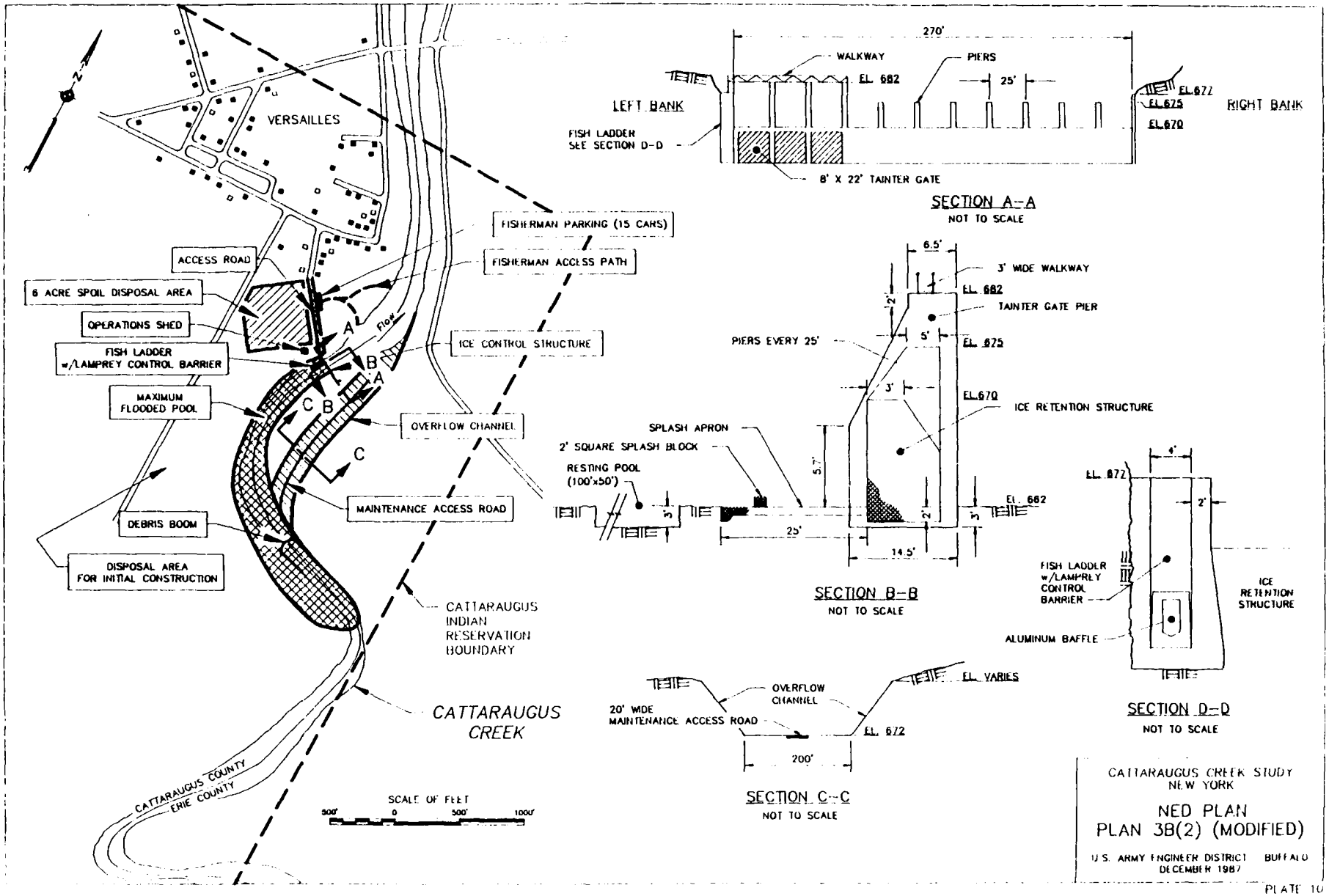

VERSAILLES
FISHERMAN PARKING (15 CARS)
FISHERMAN ACCESS PATH
ACCESS ROAD
8 ACRE SPOIL DISPOSAL AREA
OPERATIONS SHED
FISH LADDER w/LAMPREY CONTROL BARRIER
MAXIMUM FLOODED POOL
ICE CONTROL STRUCTURE
OVERFLOW CHANNEL
MAINTENANCE ACCESS ROAD
DEBRIS BOOM
DISPOSAL AREA FOR INITIAL CONSTRUCTION
CATTARAUGUS INDIAN RESERVATION BOUNDARY
CATTARAUGUS CREEK
CATTARAUGUS COUNTY
ERIE COUNTY
Flow
SCALE OF FEET
500' 0 500' 1000'
270'
WALKWAY
PIERS
EL. 682
25'
LEFT BANK
RIGHT BANK
EL.672
EL.675
EL.670
FISH LADDER SEE SECTION D-D
8' X 22' TAINTER GATE
SECTION A-A
NOT TO SCALE
6.5'
3' WIDE WALKWAY
TAINTER GATE PIER
PIERS EVERY 25'
EL. 675
EL.670
ICE RETENTION STRUCTURE
SPLASH APRON
2' SQUARE SPLASH BLOCK
RESTING POOL (100'x50')
EL. 682
25'
14.5'
SECTION B-B
NOT TO SCALE
EL. 672
FISH LADDER w/LAMPREY CONTROL BARRIER
ALUMINUM BAFFLE
ICE RETENTION STRUCTURE
SECTION D-D
NOT TO SCALE
OVERFLOW CHANNEL
EL. VARIES
20' WIDE MAINTENANCE ACCESS ROAD
EL. 672
200'
SECTION C-C
NOT TO SCALE
CATTARAUGUS CREEK STUDY
NEW YORK
NED PLAN
PLAN 3B(2) (MODIFIED)
U.S. ARMY ENGINEER DISTRICT BUFFALO
DECEMBER 1987

PLATE 10